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[Founded in 1849 as the "Journal of Gas Lighting."]

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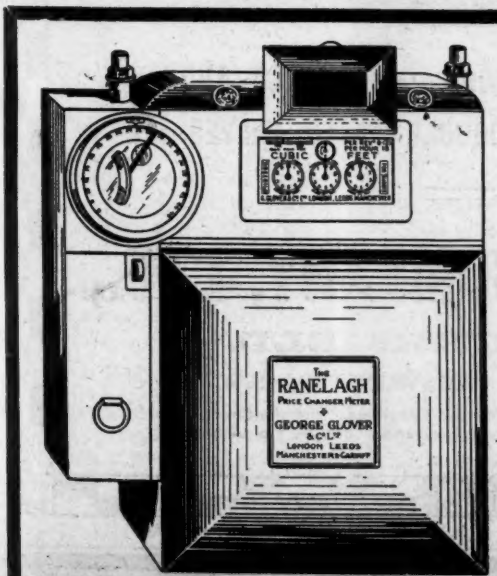

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CLV., No. 3038.] WEDNESDAY, AUGUST 3, 1921. [73RD YEAR.

EDITORIAL NOTES.

Approaching End of the Session.

THERE is to be no autumn meeting of Parliament this year unless something unforeseen happens in connection with the Irish question that necessitates a special session. This is the Government fiat; and it is hoped that the present session will end between Aug. 19 and 26. The reason given is that our legislators are dead-beat; but among them there is not common endorsement of the plea of mental and physical fatigue. There is no question, however, that it has been a trying session—what with the labour difficulties (including the long miners' strike) and the remarkably hot summer that we have so far had. The troubles of the session have not been lessened by the Government attempting too much in respect of experimental and controversial schemes. There is the Railway Bill—a measure that, in view of railway decontrol, is in some respects necessary, but concerning parts of which (particularly in regard to rates for the conveyance of goods) there is anything but a unanimous view in the country. There is the Safeguarding of Industries Bill, which very few people seem to want, other than certain industries that desire protection in order to get them stabilized. This measure the Government are pushing on with in fulfilment of their pledges to the industries interested. There is the Licensing Bill, to impose certain new regulations on the drink traffic. This has not produced the same amount of resentment, since the Government have compromised over the matter of hours. Certain other Bills will move forward; and there are a few measures in the balance which will be proceeded with subject to time being found for them. A number of Bills have also passed the Commons, and are now awaiting consideration by the Lords. Among the Bills which have been thrown overboard are the Summer Time Bill (which proposed to make permanent the alteration of the clock in the summer months) and the Electricity Supply Bill—the appendix to the 1919 measure. The intelligence that the last-named has been definitely jettisoned will be received with mixed feelings by the electric supply industry. It has not been unprepared for this; but now the expectation has merged into fact, it may be anticipated that pleasure and resentment will be found facing each other in marked contrast. The Government are in a tight corner in respect of promises and the legislation of major and minor importance. And now there is the House of Lords. These important and other measures the Government expect the House of Lords to consider, discuss, and pass for Royal Assent in as many days as the work took the Commons weeks and months to deal with. This is neither just to the Lords nor to the nation. For example, it is not expected the Railway Bill will be ready for the Lords before Aug. 9; and the Safeguarding of Industries Bill it is hoped to pass on to them on Aug. 15—only eleven days before the second date given by the Government for ending the session! In previous sessions, the House of Lords have vigorously protested against having important Bills hurled at them at the eleventh hour, and then be expected to accept them without critical examination. This is simply reducing legislation to a farce.

Special Orders for Next Session.

WE will not review the gas work of the session at this stage. A more convenient time will be when the Acts are before us. The work at the Board of Trade under the Gas Regulation Act is proceeding smoothly, systematically, and satisfactorily under the guidance and judgment of the Director of Gas Administration (Mr. H. C. Honey). Already somewhere about eighty Orders have been issued under section 1 of the Act, and some half-a-dozen Special Orders. Nothing but the utmost diligence and concentration could have succeeded in accomplishing so much in work that was absolutely new and intricate, and practically every case in which presented considerations differing from all others. Though certain general principles have been adopted in dealing with the work, the conditions of every case have to be explored, and decision as to the revision of the old terms has to be founded upon the result. There is great responsibility in this. But persistent application is making good inroads into the extensive work; and now that the initial and more difficult work is accomplished, probably the pace will be accelerated.

The particular point, however, to which we wish to direct attention betimes is the useful power conferred on the Board by section 10 of the Act providing for Special Orders. Many gas administrations will be shortly considering the question of legislation for next session. The route provided by the Board of Trade and Special Orders under the Act should not be overlooked in deciding to make application for enlarged and fresh authorization and amendment of existing conditions. The powers and conveniences of section 10 were deliberately framed, and agreed to by Parliament, for the utmost use to be made of them. Nevertheless, there are some gas managements who have not even yet fully grasped that practically all that an Act of Parliament can confer can be secured through the Board of Trade and a Special Order. Conference enabled Sir Harry Samuel's Committee to rule, when dealing with the Swansea Gas Bill in the current session, that applicants for Special Orders can have their sliding-scale terms transformed to the conditions of the South Metropolitan Gas Company's plan for dealing with profits and dividends; so securing the advantage of a minimum dividend, which is a highly valuable condition in the eyes of investors after what the gas industry has been through owing to the inability of the sliding-scale to meet exceptional circumstances during and since the war. The Special Orders that have been already issued, as well as those which have not yet been dealt with, show the great range of the powers and modifications that can be secured under section 10 of the Act. All the issued Special Orders revise existing powers. Additional capital is provided for extensions of works and limits of supply, acquisitions of and amalgamations with other gas undertakings, purchase of gas in bulk, specification of the sizes and materials of internal pipes and fittings—in fact, all the powers that could originally be obtained by Provisional Order under the Gas and Water Works Facilities Act can be obtained by Special Order, together with the powers which modern developments have necessitated, as well as the additional authorization defined in the subsections of clause 10 of the Act, as printed in the "JOURNAL" for Aug. 11, 1920.

We shall be very much surprised if next session does not see a considerable augmentation of gas excursionists along the Board of Trade route, while patronage of the old parliamentary route will be almost *nil*. This is precisely what is happening in connection with the railway and electricity systems. The Ministry of Transport deals with the former; and the Electricity Commissioners (through the Ministry of Transport) with electricity supply powers. The Board of Trade have charge of the interests of the gas industry; and the industry will find it an economy to make the most of the change.

An Annual Convention.

It is not a matter of common occurrence that a prominent member of the gas industry and one of the electricity industry simultaneously have practically the same thoughts and ideals, and give publicity to them. But this has happened. On July 20, we published and commented upon an article by Sir Arthur Duckham that appears in the current issue of the "Bulletin of the Society of British Gas Industries," of which Society he is the President. The article was on the need for reorganization in the gas industry, and the holding of an annual meeting of the whole of the principal organizations at the same time and place under the *ægis* of a British Gas Association, of which the existing organizations would be the components, while retaining their present individuality in respect of functions. The annual meetings would be held much in the same way as that of the British Association. The President of the British Gas Association would deliver his address; and thereafter the constituent bodies would be dismissed to hold, under their respective Chairmen, their separate meetings. This does not cover the whole scheme; there is more in it. But what is said here is sufficient for the present purpose, which is to draw attention to a similar suggestion made by Mr. H. Richardson, the General Manager and Engineer of the Dundee Corporation Electricity Department, in his Presidential Address to the Incorporated Municipal Electrical Association, which was delivered the day that publication and comment were given by the "Journal" to Sir Arthur's views. He could not therefore have seen what was suggested by the President of the Society of British Gas Industries. Not quite so ambitious as Sir Arthur, Mr. Richardson only seeks an annual convention of the whole of the organizations of the electricity industry. The proposal seems to be rather of an amorphous character, owing to the absence of the headpiece that Sir Arthur gives to his scheme by contemplating the welding of all existing gas organizations into a British Gas Association. Nevertheless, the annual convention parts of the two schemes run on such parallel lines that the fact is peculiarly noticeable.

What is the primary object of Mr. Richardson's proposal? Co-operation of all branches of the electricity industry; and co-operation is the very idea, and the vital need, that inspired Sir Arthur's scheme in connection with the gas industry. The more complete the union of all the organizations, the greater the strength. In the circumstances of both industries to-day, it is undeniable that the more perfect the strength which can be achieved through co-operation upon their affairs and interests, the better for them both in the present and the future. Thinking men in the gas industry know that we cannot now afford to sacrifice a single part of the talent and power we possess in the industry through preventing the best possible collaboration. And the view of thinking men in our industry is that of thinking men in the electrical industry. This some men may "pshaw;" but their personal contempt, born of narrow minds and restricted outlook, will not alter the fact. The promotion of co-operation then between all sections of the electricity industry is the principal object of Mr. Richardson's proposal for an annual convention; and that is highly important. The advantages he sees in the project do not end there. At the present time, as he points out, each electrical association does its best to exercise political influence when necessary in its legitimate interests; but those interests are, from the individual point of view, of relatively circumscribed order. When regarded in the aggregate, the interests become a much more important matter. In respect of this aggregate of interests, the annual convention would give opportunities for conference and joint action. Mr. Richardson has also an eye to publicity and propaganda. A small annual meeting has not the same magnetic influence as a large and powerful convention; magnitude tells and attracts. The public would be more concerned in the doings of the electricity industry (the same applies to the gas industry) if a convention brought together a considerable number of people with cognate interests, and if provision were made for a popular side to the convention, apart from the more prosaic matters interest in which is confined to the technical or commercial men of the industry. Further, lay Press would also be attracted; and this would have good advertising value.

These are points from the electrical side regarding co-operation, conference, and action. If Sir Arthur and Mr. Richardson had been in collaboration over these matters, they could not have run shoulder to shoulder much closer than they have done up to a point, at which the former goes the additional distance by proposing a headpiece—the British Gas Association. Even in the steps to be taken to get a preliminary move on, they agree that the matter should be referred to the joint consideration of the Councils of the existing organizations. There is interest in so much unity of view of simultaneous origin.

Gas Profits for Gas Service.

The Manchester Corporation are setting an excellent example in their Bill now before Parliament—an example that will commend itself to all gas men, and be applauded by all who believe in the principle of a municipal trading enterprise being run for the benefit of those of the public who patronize and support it. Profits made from a municipal trading undertaking should be utilized with the view of improving the property of the concern, or promoting its economies, and so reducing the cost of the service to the customers. To transfer surplus gas profits to the rates is simply to make consumers pay a larger contribution to the public funds than ratepayers who are not consumers. This is not just. Alderman William Kay, the Lord Mayor of Manchester and Chairman of the Gas Committee, has laboured hard in the attempt to break-down this iniquitous but deep-rooted municipal policy, and so did his predecessor in the chair, Alderman Gibson. It has only been by persistent effort, and by a stubborn refusal to be made by opposition and adverse votes to desist in doing the right, that eventually the Manchester City Council were, in the autumn of last year, induced to pass a resolution that surplus revenue from the trading undertakings should not be transferred to the relief of the rates. This is a decision that will have far-reaching influence; and when the Bill becomes an Act, there can be no going back upon the resolution, and having it rescinded, seeing that the measure contains a clause which would make such a course absolutely illegal.

The clause will come into operation on March 31 next year. It prescribes how the revenue is to be applied. If at any time there is a deficiency, there is to be repayment to the City Fund. This is a very proper provision; and alone it will be an inducement to the Gas Committee to budget to the best of human ability so that there shall be no deficiency. From the revenue, too, a fund can be established for working capital, but not exceeding £400,000; and it may be built-up by sums to an annual maximum of £40,000. A reserve fund is also provided for, to be formed by accumulations at a rate not exceeding ½ p.ct. of the borrowed money outstanding, until the reserve amounts to 10 p.ct. of the outstanding borrowings. This is all highly satisfactory, and equally so is the fact that as soon as the residue of profits carried forward exceeds the amount required for interest and sinking fund for one year, the balance is to be utilized for a reduction in the price of gas. The costs of producing and distributing gas have risen considerably; and there is good reason for utilizing every resource for cheapening the supply. The only legitimate application of any surplus money derived from the sale of gas is the reduction of price to those whose custom has provided the surplus. The cheaper the gas, too, the greater the advantage to Manchester generally. The more non-smoke-producing fuel is used, the better for the atmosphere of the city, which within our recollection has never been able to boast of any exemplary characteristics in respect of cleanliness. What this has cost the citizens in health and labour defies all estimate; but that it must have been annually and in the aggregate an expensive matter is beyond question. We are not so foolish as to suggest that, if the gas profits had not been transferred to the rates, atmospheric impurities would all have been avoided by the use of the lower priced gas; but what we do say is that the cheaper the gas, the greater the inducement to use it both for industrial and domestic purposes in place of smoke-producing fuel. To the extent that this is done, the greater the purity and cleanliness of the atmosphere. Purity and cleanliness in this respect is a growth which needs culture, and therefore the means for facilitating it. Gas is one of the first elements in these means; and the measure of its use largely depends upon the cost of the heat units supplied by it.

By this change in policy the Manchester City Council are giving a lead which should have a highly influential result. It is a great pity the Government do not make the similar treatment of profits an obligatory matter in all municipal trading, and deficiencies a debt that has to be repaid by a revision of the charges of an undertaking—

whatever the nature of its business. This would smarten-up some local authorities, and cause them to conduct their trading concerns on sound commercial principles.

Gas and Electricity Producing Combinations.

The scheme of nine London Electricity Companies to erect a super-station alongside the Beckton Gas-Works of the Gas Light and Coke Company, and utilize coke from the neighbouring retorts (probably also power gas), and to pay for the conveniences afforded by the jetties and railway communications instead of embarking upon unnecessary capital expenditure, is one that has attracted the attention of a large number of technical men as a development of no mean order in regard to potentiality. Comment was made upon the matter in our issue for July 13. Then it was seen that the project is supported by front-rank men in the electrical industry. But since, as noticed in our news columns last week, Mr. C. H. Merz has been giving evidence in which he indicates that he is not altogether in agreement with the proposal. His disagreement is radically weak; and, as the previous article showed, the weight of electrical expert opinion is certainly not on his side. The dissent of Mr. Merz can be whittled-down to a very narrow point, inasmuch as he adopts the theory that electric power stations should be worked in conjunction with coal-carbonization plants. This clears the position considerably. Another point that narrows the difference is that he has no objection to co-operation between the gas and electricity industries. With him, it is a question of degree. He feels that the scale of operations in London would have to be so large as to justify the erection of a coal-carbonization plant to collaborate direct with the electricity generating plant. This is interesting. If such a plant is justified in the case of London, then in view of the largeness of the stations which it is proposed to erect in other parts, what is right for London would assuredly be right elsewhere, seeing that the ultimate intention of the reorganization scheme for the whole country is concentration of generation by massing plant.

In his evidence, Mr. Merz gave only one or two reasons for his dissent. The first is an unsound one. This is that it is only by incorporating coal-carbonization as part of the electricity generating scheme that the electricity consumers will get the full benefit of the secondary products. His view is that in the Beckton scheme the Gas Company would get all the benefit of the gas-products, and would merely sell the Electricity Companies the surplus coke on the basis of heat units relative to the price of coal. We should like to see a thermal and cost balance-sheet drawn up by Mr. Merz. So far he has only indulged in generalization. The first thing that his plan would mean would be the attaching of a new industry on to that of electricity supply. The capital expenditure would be immense to treat the quantity of coal that would be required for London and the Home Counties; and the capital charges would have to be borne—not by the electricity generating plant, but by the revenue derived from the coal-carbonization plant. The primary work of such a plant would be to make fuel and sell it (at a paying charge) to the electricity station, and the net cost of this fuel would be the cost of the raw coal, *plus* the capital charges on the coal-carbonizing plant, depreciation, renewals, and working expenses, less the income obtained from the secondary products. Therefore, to put forward the idea that the whole question is that the electricity people would be deprived of the values of the secondary products in reducing the net cost of their fuel is taking a strangely limited view of the position. We take it that Mr. Merz's intention is that both the gas and coke would be used by the station as fuel, inasmuch as there would be no market for the gas other than to the gas companies, who, if there is anything in it, would, in that event, be deprived of the value of the secondary products. But those gas undertakings that are buying coke-oven gas do not mind the deprivation. However, the tar and the sulphate of ammonia would be the only secondary products available for sale by the electricity station.

There has of late been a heavy fall in the prices of the secondary products of coal carbonization; and values have oscillated considerably during the war. The electricity suppliers adopting carbonizing plants would have to take all the risks attaching to the tar and sulphate of ammonia markets. In 1914, the Gas Light and Coke Company received for tar products and sulphate of ammonia an average of 4s. 1·16d. per ton of coal carbonized; and the capital charges on the carbonizing plant specially provided for electricity generation would be considerably in excess of this. Moreover, all coal carbonized above the quantity absolutely necessary for the country's purposes, and in excess of the power of the gas undertakings to supply fuel for electricity stations, would add to the supplies of tar and sulphate of ammonia. Already, the market for the latter is not one in which there can be any large amount of confidence in the future, in view of the utilization of nitrogen from the atmosphere for producing fertilizers. And, again, to get the heat units needed, more coal would have to be handled by the station through its carbonization than would be required by the direct use of coal or coke under the boilers. This is another reason why a more economical plan would be by fuel-trading association with the existing gas-works and their established businesses. Mr. Merz's idea of coal carbonization having direct union with electricity generation would not by any means help coal conservation. As a matter of fact, a few million tons of coal would be carbonized in excess of need, in view of the fact that coke and power gas could be produced for electricity generation by gas-works from the coal they are compelled to use. The coal conservation problem is something that must be looked at as a whole, and not be dealt with sectionally.

To adopt low-temperature carbonization in connection with electricity generation would make the position for electricity worse still. That system is probably what Mr. Merz has at the back of his mind in taking a stand against business relations with the gas industry for his fuel supply, and so helping in the national conservation of coal. We know for some time past he has been dabbling in low-temperature carbonization, and is developing a system of his own. But low-temperature carbonization means greater capital expenditure than for high-temperature work per ton of coal carbonized; and he would be a very bold man who would introduce into electricity generation and supply such a super-speculative element as the low-temperature method of treating coal.

There is only one other reason that Mr. Merz has found against taking fuel from the gas industry; and it is that he fears its shrewd business men will in the bargain get the better of the electrical men. It seems to us that Mr. Merz must either be losing his nerve, or his daily increasing experience in the electricity industry is convincing him that his professional colleagues possess a low standard of business capacity, tested (we take it) by his own. Those colleagues will surely be more amused than distressed by Mr. Merz's assessment of their acumen; and they will certainly be asking themselves whether the national debt is the only thing that has of recent years undergone inflation. Mr. Merz, by the way, was a member of certain Committees who advised the Government respecting electricity generation developments. The present chaos of the reorganization question is highly illuminating when contrasted with the contents of these reports.

A Rapid Gas Stock Issue.

Last week mention was made of the break there had been in the 7½ p.ct. redeemable debenture issues of gas companies by a company offering stock at 7 p.ct. The South Metropolitan Gas Company have gone ½ p.ct. lower, and have made a time record in modern issues. Of this 6½ p.ct. redeemable debenture stock, there was £734,000. The prospectuses were received by post last Wednesday morning, and the daily newspapers similarly announced the issue. A few hours later the lists were closed for during the morning the applications represented a large over-subscription. The lowered deposit rate, and the large withdrawals of deposits from the banks, no doubt helped to effect this gratifying result. But it shows two things—the public are on the look-out for good investment stocks; and well-secured gas stocks are very favourably regarded.

Structural Work.

The gas industry has a good deal of structural work in progress, and the volume it is expected will swell considerably when things get steadier and prices are reduced. The reduction of wages in the engineering trades will have a large bearing upon the easing of prices; and so will the market positions of iron and steel when there is restoration of output. Coal prices are, however, at present so high, and the competition from Belgium and Germany so keen, that there is ground for fear that British iron

and steel producers will not show the rapid recovery that could be wished. From the "Board of Trade Journal," we learn that the production of iron and steel in 1920 almost approximated the 1913 figures; but in the past six months, there was a steep decline compared with the corresponding period of 1920. The production of pig iron in the first half of this year was 1,565,900 tons; the figure for the corresponding months of last year was 4,145,000 tons. The production of steel ingots and castings for the same periods were respectively 1,412,600 tons and 4,877,000 tons. The decline in the United States was equally serious. Both countries in the half year were feeling the effects of general world depression and of price-cutting by Belgian and German competitors. Under these influences, makers of pig iron in this country are at present quoting prices as low as £8 10s. per ton. After the first weeks of the coal dispute, practically every blast-furnace in the country was closed-down; but with the end of the coal dispute, a slow recovery is expected, although its pace is dependent on a moderate price of coal.

First Post-Strike Outputs.

Returns have been issued as to the first two weeks' coal output results following the three months' coal strike. The strike started on April 1. Before this event, there was a considerable tailing-off in production. For the week ending March 26, the output was 3,660,000 tons, and in the succeeding working days to the eve of the strike, the total yield was only 1,950,100 tons. In the first week of the resumption of working, the output was 2,354,900 tons, and in the second week it had grown to 3,927,500 tons. Of course, there are pits not in a condition yet for a renewal of operations; there are some that can never be re-opened again, owing to the cost that would be entailed in putting them into order while their condition is that of approaching exhaustion. Industries, and therefore coal demand for them, are in a stagnant state; and further, there are still many miners unemployed, some of whom belong to the superfluous grade. Naturally, therefore, the outputs that obtained six or seven months ago cannot yet be expected. It was in December last when a peak for a week in 1920 was made. The output for the week was 5,307,000 tons. The production for the week ended July 16—3,927,500 tons—was below this December week's figure by 26 p.ct.

Fixing Coal Prices.

A question was asked in the House of Commons the other day, as to whether the attention of the President of the Board of Trade had been called to the increase in the price of coal since the coal stoppage, and to the contradictory reasons assigned for it. The reply was made that the Government had no power to control the price of coal; it depended entirely on market conditions. The Government appear to be grossly misinformed. The price does not depend "entirely" on market conditions. A recent conclave of colliery owners in certain coal areas decided that gas and household coal should be increased by 3s. per ton, and that to other consumers there should be no change in price. Was the 3s. due to market conditions, or to collusion of the owners, and the consequent arbitrary decision?

Building-Up Coal Stocks.

The reports from the various coal centres indicate that there is a ready absorption of gas coals, and the inference drawn from this is that gas undertakings are busy looking after not only their current requirements, but the laying-in of reserves for next winter. Only from Newcastle is there want of confirmation of this; the report from that centre indicating that there is not the same strength in the demand as previously. However, there is no doubt as to the very general briskness of demand, though at the same time prices are receiving close attention. While absorption of gas coal continues at the present rate, the colliery owners will be able to maintain prices both for gas and household varieties.

Costs of Coal Production and Wages.

Following up the information reported last week regarding the proceedings which it is hoped will result in the permanent settlement of a basis for coal miners' wages, the National Wages Board for the Coal Industry have met again to consider the report of the two firms of accountants who had been appointed respectively by the owners and the Miners' Federation. The report dealt with the items of expenditure to be regarded as costs of production for the determination of wages under the agreement as to the division between wages and profits of the surplus proceeds of the industry. It was hardly to be expected that there would be any immediate and unanimous concurrence by the two sides of the Board with the recommendations of the accountants. Some points were agreed to, and others were referred back to the accountants. It looks as though the independent Chairman of the Board (for whom provision has been made) will have to be called in to determine matters that do not appear likely to be solved by the Board without external aid.

National Union of General Workers.

The gas industry is deeply interested in the National Union of General Workers. The Gas Employers' Federation have a good deal of business to transact with the officials of the Union; and both sides meet with more common sense guiding their deliberations than has been found lately in some official quarters of the industrial world. Mr. Arthur Hayday, M.P., is one of the organizers of the National Union of General Workers. He is also one of the Joint Secretaries of the National Joint Council for the Gas Industry. He gave some information the other day regarding the financial position of the Union. It appears from it that the Union started this year with a balance in hand of £546,000. There are 100,000 members totally unemployed and 480,000 wholly or partially employed. From December to July 13, £442,000 was expended upon unemployment—to say nothing of the State benefit which the Union administer. The cotton dispute cost the organization £30,000, and pay to members employed at the coal pits involved in the coal stoppage was £39,000. Although there has been a severe strain on the funds, the Union are able to meet liabilities, and have a balance in hand of nearly £200,000.

Gas Oil Prices.

We are getting to more reasonable prices for gas oil; and this will be an incentive to its greater use for gas making. The "Petroleum Times" announces that last week there was a reduction of 1½d. a gallon—making the price 5½d. net and naked, *ex*-wharf.

OBITUARY.

Mr. T. H. Nixon passed away last week at his residence, "St. Heliers," Walton-on-Thames, aged 70. He was formerly with the South Metropolitan Gas Company, and for a short time Engineer in charge of the Bankside station of the Company. The interment was in the cemetery of Walton Parish Church, and was attended by Dr. Charles Carpenter and Mr. A. F. Browne, representing the South Metropolitan Gas Company, and Mr. Thomas Price, representing the Southern Association of Gas Engineers and Managers, of which the deceased was a member.

PERSONAL.

Among the passengers who had booked their passage on the "Mauretania," when the vessel was so severely damaged by fire that the sailing had to be cancelled, was Mr. C. A. Goodall, Managing-Director of Messrs. Goodall, Clayton, & Co., Ltd., Leeds, who is paying a visit to the United States and Canada. We understand that Mr. Goodall, who is accompanied by his wife, had their passage transferred to the "Columbia," and sailed from Glasgow on Saturday last. Mr. Goodall hopes to return to England about the middle of September.

The Chesterfield Town Council have decided that the amount to be paid to Mr. J. W. B. Simpson, Secretary and Accountant to the old Chesterfield Gas and Water Board, as compensation for loss of office, shall not exceed £322 per annum. Mr. Simpson had expressed his willingness to accept £350 a year.

Mr. W. Cartwright has been appointed Manager of the Cleobury Mortimer Gas-Works. He and his brother, Mr. J. Cartwright, who is Manager at Colwall, had been for some time with Messrs. Bale and Hardy and Tully's Gas Plants, Ltd., and have had considerable experience in erection work. Mr. Cartwright is only 20 years of age.

The Gas Light and Coke Company's Dividend Announcement.

The Directors of the Gas Light and Coke Company have declared dividends for the half year ending June 30 last as follows: On the 4 p.ct. consolidated preference stock at the rate of 4 p.ct. per annum; on the 3½ p.ct. maximum stock at the rate of 3½ p.ct. per annum; on the ordinary stock at the rate of £4 13s. 4d. p.ct. per annum.

THE INTERNATIONAL COMMISSION ON ILLUMINATION.

THE first technical session of this Commission—the successor of the International Photometric Commission—was held in Paris from the 4th to the 8th of July, in the building of the Société du Gaz.

Those interested in illumination problems in Belgium, France, Great Britain, Italy, Spain, Switzerland, and the United States of America, were represented at the session, which was opened by the Minister of Public Works, who welcomed the delegates in the name of the French Republic.

The British delegates, nominated by the National Illumination Committee of Great Britain, were:

Major K. Edgcumbe, Institution of Electrical Engineers, Chairman of the National Committee,
Mr. C. C. Paterson, O.B.E., Hon. Secretary and Treasurer of the International Commission,
Mr. A. P. Trotter, Illuminating Engineering Society,
Dr. E. H. Rayner, National Physical Laboratory,
Mr. Leon Gaster, Illuminating Engineering Society,
Mr. Robert Watson, Institution of Gas Engineers,
Mr. J. W. T. Walsh, National Physical Laboratory, Assistant Secretary of the International Commission.

The subjects dealt with by the Commission were as follows:

(I.) The unit of candle-power at present in use in this country and in France, and U.S.A., was adopted for international purposes and is to be known as the "International Candle." It is to be maintained by means of electric incandescent lamps at the national laboratories of the three countries named.

(II.) The definitions of the term "luminous flux," "luminous intensity," and "illumination," and the units of these quantities—viz., the lumen, the candle, and the lux (metre-candle)—were agreed upon.

(III.) The subjects of heterochromatic photometry (including physical photometry, and the characteristics of the "normal eye"), factory lighting, and automobile headlighting were also discussed at the meetings, and Sub-Committees were appointed to study the questions from the international standpoint during the next three years.

The new President of the Commission is Dr. E. P. Hyde, the Director of the Nela Research Laboratories of America. Major Edgcumbe is one of the three Vice-Presidents.

The next meeting of the Commission is provisionally arranged to take place in New York in 1924.

FACTORIES AND WORKSHOPS REPORT.

REPORTING to the Home Secretary on the work of the Factory Department during the year 1920, Mr. R. E. Graves, C.B.E., the Chief Inspector of Factories and Workshops, says that a great deal of information was sent in by the inspectors which, in the interests of economy, it has been necessary either to reduce to a short summary or to omit altogether. In spite of the great trade depression during the year, registered factories increased from 135,454 in 1919 to 140,064 in 1920; while workshops continued to disappear—the numbers being 141,971 in 1920, compared with 145,737 in 1919, and 153,797 in 1914. The number of persons employed in factories in the year 1919 was 6,127,706; and in 1913, 5,342,625.

Various pamphlets and memoranda were issued by the Department during last year; the subjects dealt with including the dangers connected with the use of acetylene gas. The Departmental Committee on Lighting of Factories and Workshops, appointed in January, 1913, issued their first report in 1915, when their work was temporarily abandoned, owing to the war. The Committee subsequently resumed their investigations; but owing to the urgent need for economy, it has since been found necessary to restrict their inquiries. The Committee are assisting the Department in the preparation of a pamphlet on lighting in factories and workshops, which it is felt should prove very useful. It may be noted that the scientific and technical staff of the Department is to be considerably strengthened in order to cope with new developments in regard to safety and health. The special engineering staff will be reconstituted and enlarged; and four additional electrical inspectors are to be appointed to enforce the safety requirements of the electricity regulations.

The first of the twelve special chapters into which the report is divided is by the Chief Inspector, who makes mention of the fact [alluded to on p. 220 of last week's "JOURNAL"] that a notable departure in the Stockton district is the erection at the Skinningrove works of a plant on the cell principle for the deposition by an electro-static process of dust from blast-furnace gas, in order to make the gas available for the generation of power as well as heat in the works. From the dust are recovered high percentages of potash and other valuable chemicals.

The need for greater care on the part of workers and of better safety organization on the part of employers—to secure which is the object of what is known as the "Safety First Movement"—is emphasized by Mr. H. J. Wilson, O.B.E., Superintending Inspector of Factories. During the past year, no fewer than 138,773 accidents (1404 being fatal in character) were reported, which was an increase over the preceding year of 12,750. A larger use of acetylene gas, mainly in connection with oxy-acetylene welding and cutting processes, has unfortunately been accompanied by a rise in the number of accidents arising from explosions of mixtures of this gas with air or oxygen. This led to the issue of the memorandum already referred to, containing a summary of precautions necessary for the safe use of acetylene.

Five explosions through the ignition of coal gas are reported. In one case (which resulted in two men being killed and injury to four others) a gas-works purifier cover was being repaired, and a leakage of gas was presumed to have been ignited by a spark from a hot rivet.* The Coroner's Jury suggested that in future the purifier cover should be sufficiently raised to allow men to escape easily in an emergency. Two other explosions—both due to the ignition of an accumulation of gas in a confined space—took place in gas-heated stoves. It is pointed out that these occurrences emphasize the necessity for completely cutting off the gas supply when such stoves are not in use. Another explosion (which accounted for one death and two cases of serious injury) was the sequel to a leakage of gas used as an illuminant by workmen inside a tank. The explosion was caused by their re-entering the tank with a naked light. The firm will use electric lamps for such work in future. The fifth explosion occurred in a 100-light gas-meter in an office which at the time happened to be unoccupied. The report explains that compressed air used in connection with gas-burners leaked into the gas-main, and in the absence of a non-return valve was forced into the meter. When an attempt was made to light a gas-jet, the ignition travelled through the gas-pipes, and caused the explosion of the gas and air mixture in the meter. Whenever air under pressure is used in connection with a gas supply, it is remarked, a non-return valve should be fitted in the gas-pipe on the delivery side of the meter.

In connection with the use of electricity in factories, the number of accidents reported during the year was 394, of which 25 were fatal. These figures are practically identical with those of the previous year. Of the fatal cases, 18 were from shock from alternating current at low-pressures—which bears out previous experience.

In the chapter on health and sanitation, it is stated that the principal official of an important insurance company doing a large business with cotton-waste firms, definitely informed an inspector that no increase in the premium was made by his company on account of the introduction of certain types of heating in cotton waste premises. He instanced heating by steam or hot water if the boiler was outside the building, electric radiators, gas-fires, or gas-stoves. The premium might be considerably raised, or insurance refused, if the heating was by means of open-fires, open-fire stoves, slow combustion stoves, or if there was a boiler on the premises. Miss Martindale, O.B.E., remarks that several of the inspectors comment on the evils arising from flueless gas-stoves. These stoves are only tolerable where there is exceptionally good ventilation; and in such circumstances great difficulty is experienced in maintaining an adequate degree of temperature.

Mr. Bennett gives a simple method of detecting the escape of gas fumes from gas stoves into workrooms: Some blackboard chalk or blotting-paper is soaked in carbontetrachloride ($C Cl_4$), and then placed over the air inlet-openings of the gas inlet-pipe of the stove. The suction carries some of the tetrachloride into the fire, where, by combination with hydrogen in the coal gas, it becomes hydrochloric acid gas. Another piece of blotting-paper or sponge soaked in strong ammonia is next moved about in the neighbourhood of the hood or near joints or suspected leakages, and small white clouds of ammonium chloride are formed with the hydrochloric acid, which are easily seen. In this way, the efficiency of removal of fumes is definitely settled one way or the other. A test of this kind in an ironmonger's shop of a flueless gas-stove about to be installed by an occupier who sought the approval of the Department, led at once to its rejection.

The subject of lighting is dealt with by Miss Rose E. Squire, O.B.E., who says there is evidence that the importance of adequate and suitable illumination is being increasingly recognized by employers, and that a high degree of brilliancy, not only on the field of work, but in the general lighting of the room, is appreciated by the workers. Improvements are reported both as regards natural and artificial lighting. Along with a wider adoption of electric lighting in substitution for gas, instances are quoted of good results which have followed from the installation of pressure gas-lighting systems. The activity being shown by employers in seeking to improve the artificial lighting of their works, she says, makes it necessary that information as to the principles which should guide them in the installation, and as to the best methods of achieving their object, should be available without delay. The most obvious defect in many new installations is that of glare, chiefly due to the increased use of half-watt lamps, which are substituted for the ordinary vacuum electric globe, and used with inadequate shades. The rival claims of general diffused lighting and localized lighting confront the employer. The former is gaining in favour for factory use. The relation between the safety of the workpeople and the efficient lighting of every part of the factory has not yet been sufficiently appreciated by many employers. In America, six States

* See "JOURNAL," Vol. CLI., p. 247.

have already adopted codes of industrial lighting; and the inspectors there are in some cases provided with a pocket instrument for testing the amount of the illumination. The many and varied problems involved in industrial lighting are to receive further consideration in the coming year, as the Home Office Committee on Lighting in Factories and Workshops, appointed in 1913, resumed their sittings in November with the addition of some new members. As already mentioned, the Committee propose to issue at an early date a memorandum for the guidance of employers and others, which will supplement and make more easily available the information given in their 1915 report.

A portion of the chapter on industrial diseases, by Dr. T. M. Legge, C.B.E., Medical Inspector of Factories, is devoted to pitch warts. Of the 45 cases (with one death) of epitheliomatous ulceration included in the returns during the year, 33 were due to pitch, nine to tar, and three to paraffin. The fatal case occurred to a man employed as a stoker in a gas-works. Dr. Legge remarks that the difficulty of securing a voluntary medical examination to prevent pitch warts among the patent fuel workers of South Wales becoming inoperable has been considerable. The workers had asked for it themselves; but owing to the very slow onset of the incapacitating condition, their interest evaporated. Efforts made by the issue of notices circulated among the men, calling attention to the examination, and asking them to submit their names on a printed form, aroused their suspicion. Eventually, with the help of the employers (who throughout have given every assistance), the district inspectors were furnished with complete lists of all workmen employed, together with the age, duration of employment, and precise occupation of each man. Recognizing the slow onset of the disease, it was decided to mark as "requiring examination now" only those men aged over thirty years, with a duration of employment of over ten years, engaged in an occupation exposed to risk. Dr. Scholberg, after comparing various ways of treating pitch warts, prefers the use of carbonic acid snow, which does its work without the danger of septic poisoning, which not infrequently attends cauterization.

ELECTRICITY SUPPLY MEMORANDA.

The Municipal Electrical Association have been holding their annual meeting at the Institution of Mechanical Engineers, under the presidency of Mr. H. Richardson, General Manager and Engineer of the Dundee Corporation Electricity Department. The members of the Association would have been on the other side of the Border weeks ago for their Annual Congress, had the miners not ruled otherwise. When the coal strike was over, they would have met at the Institution of Electrical Engineers, but the long-drawn-out inquiry into the electricity schemes for London and the Home Counties ordered them to find accommodation elsewhere. So this nomadic organization found refuge at the Mechanicals. There was a very good meeting; and the subjects discussed contained many excellent points. The President's address was a catholic deliverance in which it was seen that he prefers to look upon the interests of the electricity industry as a monolith, and not as something that is composed of a great number of parts, between some of which there can be no proper cohesion. He wants to see the whole of the organizations hold an annual convention at one time and in one place; and he views as quite unnecessary the lack of co-operation between the municipal and the company undertakings. The division does seem silly when one comes to think seriously regarding it. Broadly viewed, the President of the Association has discovered that the interests of the municipalities and companies run much more parallel than many seem to think, and that the industry has much for which to thank private enterprise in respect of pioneer work.

Oneness of Electrical Interests.

The bi-part tariff had good advocacy at the meeting. The President says the tariff question is no longer a matter of difficulty or a mystery. And, in his view, nothing can be clearer than the necessity for a simple charge for all purposes (he was referring to domestic uses) being based on a standard created according to the practical demands of the consumer. He spoke also against the arbitrary complications in tariffs which have been the cause of so much trouble. At Dundee, the primary charge in a bi-part tariff is based upon floor area! No one will dispute the necessity for a simple charge; but the lump sum, *plus* a low charge for current, will have its limits in application. Only consumers who are in fairly affluent circumstances will care to be faced with the payment of a fixed solid sum, no matter the amount of their consumption. The popularity of the penny-in-the-slot gas-meter, instead of a quarterly account, is proof of this. The matter was further dealt with in a paper by Mr. C. W. Charlesworth, of Wolverhampton. He also prefers a two-part tariff. He points to the various bases for the standing charge—viz., installation, demand, number of rooms, ratable value, floor area, &c.—and submits that, though it may appear unfair to assess this on any basis other than class of consumer and demand, it is well not to be too definite on the point. Every workable basis is open to some objection. But Mr. Charlesworth does not think that one basis is applicable to every class of consumption. He says that there is one point certain, that to be generally acceptable the bases of charge for power and industrial users, business premises, and domestic consumers cannot be the same. With power and industrial consumers (usually a small number of large ones) actual measurement of demand is practicable and worth while, and will do away with much uncertainty; while with business premises, experience should enable the total connections to be used as a measure. Domestic consumers present an entirely different problem; but it should be possible to devise a scale on a simple basis that would meet the required allocation of standing expenses to this class of consumer. An important point is to bring the unit charge down as low as possible; and Mr. Charlesworth has found a standing charge of 15 p.ct. on the ratable value, with a follow-on charge of ½d. per unit, very popular. The consumer is, he says, content in the knowledge of his fixed amount, and realizes that it does not pay to worry about the exercise of the petty economies which are pressing in the case of a flat-rate.

The Two-Part Tariff.

There is a point in this connection that should not be avoided. Authors of papers on the subject are very prone to overlook it, and to draw deductions that are altogether wrong. Mr. Charlesworth gives a table, showing a year's sales for residential supplies; and he claims that the figures indicate the effect that can be produced upon output and revenue by the introduction of a multipart tariff. He compares his consumers on the flat-rate system with those on the two-part system, as though the consumers on the one would necessarily have correspondence with those on the other if they were transferred. It does not in the least follow that they would. It is more than probable that the consumers on the two-part system are the cream of the whole body of customers, and that, if the whole of the flat-rate consumers were transferred to the two-part custom, the average price per unit would ascend, and the average revenue per consumer would descend. The over-all financial conditions would undergo an appreciable change. The table is worth giving for comparison:

No Parity in Value of Consumers.

	Flat-Rate.		Multipart Tariff.
Number of consumers	817	..	326
Units sold	227,207	..	488,853
Revenue—			
Standing charge	—	..	£1,276
Unit charge	£2,810	..	1,019
Total.	£2,810	..	£2,295
Average per unit	2·97d.	..	1·13d.
Average per consumer—			
Units sold	278·1	..	1,499·5
Revenue.	£3·44	..	£7 04

It will be seen that the undertaking secures more revenue by supplying 227,207 units at a flat-rate than by supplying 488,853 units on the two-part tariff; but the average revenue per consumer is greater under the latter than the former. If a comparison of this kind is to be effective in carrying conviction, much more than the information in the table is required. We have no assurance that one consumer is as good as another in the matter of genuine profit if transferred from one system to the other, particularly if the secondary charge is very low. There are several items bearing upon expenditure that require critical examination; and the incidence of demand is a factor that is important in the case of individual consumers. It is impossible to swallow the case presented as being altogether convincing, in view of the poverty of details.

No Supplementary Act this Session.

The Electricity Supply Bill—the supplement to the 1919 Act, which created the Electricity Commissioners—is earmarked to fall in the Massacre of the Innocents. Whether it will be revived next session, we do not know; but whenever it does, if it is in its present form, it will have to meet formidable hostility, which will cause the Government some amount of trouble. We are of opinion that the Government are at the present time secretly glad to be rid of the measure, notwithstanding there are people who are firmly convinced that it is necessary to the establishing of Joint Electricity Authorities. But in the electricity industry there are many responsible men who do not regard the Bill as an innocent, who are opposed to the financial development proposed, and who think it is totally unnecessary. There are industrial magnates and large ratepayers who are of the same opinion, and who are absolutely antagonistic to local rates being pledged in any way to support a piece of pure speculation. The longer the development is deferred of the joint electricity authorities, the greater the number of reasons found for allowing the industry to grow, by natural means and courses, from the position its constituent undertakings occupy to-day. Many authorities are satisfied that the cost to them of energy through the joint authorities will not be more advantageous than from their own plants as developed to greater economy. There are arguments advanced that the diversity of demand on large generating stations such as are part of the scheme, through distributing over an extensive area, will mean lower costs; but, on the other hand, an undertaking can be so big that there is a loss of efficiency. It is also obvious that the good electrical areas will have to suffer from the disadvantage of being associated with distribution to and for remote bad

electricity-consuming areas. The merging of good and bad must cause the cost to the good to be more on the average than it would be if standing alone with highly efficient equipment.

Individual Applications for Tariff Revision.

In view of the Electricity Supply Bill having failed as an immediate vehicle for obtaining statutory sanction to the universal application of the bi-part tariff, "Electrical Industries" again holds-up precedent in the Grimsby Corporation Bill as a model to be adopted. The writer obviously is so persuaded as to the efficacy of the two-part tariff that he thinks there should be as little delay as possible in establishing it as the recognized mode of charging for electricity. Even if the Electricity Supply Bill is re-introduced next year, there is no assurance that it will contain the clause to legalize the double-branched method of charging, nor that the measure will be passed. Therefore it is regarded as the correct thing that preparations should be made for individual or joint applications next session for the revision of the system of charging. When the Grimsby Bill was before the Local Legislation Committee, the members were informed by Mr. Jeeves that the Minister of Transport was considering the question of the propriety of the proposal being made general; and therefore the Minister suggested that the Grimsby application should be deferred, and be subject to his decision on the general problem. Mr. Jeeves admitted that the method of charge might not apply to some undertakings; but he did not think that in any particular application for a revision of the powers of charge that, if the case could be proved, the change should be denied because a Department had the matter under consideration. Moreover, the Grimsby Corporation, he pointed out, were not asking for any arbitrary power; and they only wanted to exercise it with the approval of the Electricity Commissioners. He also commented on the fact that Departments were not always able to get alterations in the general law until they had behind them the pressure of a number of precedents passed by the Local Legislation Committee. And the Committee—perhaps flattered—allowed a precedent to be formed in this instance.

Supplying Consuming Appliances on Hire.

The heavy charges that are being made in these days for electrical appliances, and the inertness of domestic consumers in the matter of adopting electrical operation other than for lighting, cause the electrical papers ever and again to advocate a larger application of the rental system. Some writers think the suppliers of electricity and the manufacturers of the appliances might well come to some arrangement whereby the latter are supplied, and are paid for as and when the rental is received. But these writers have a very abbreviated outlook. They do not appear to realize that capital is as expensive for the manufacturers (if not more so) as for the electricity undertaking, that the money resources of manufacturers have their bounds, that the manufacturers have to pay cash-down for labour and materials, and that they could not go very far in financing electricity suppliers, and waiting years for their money, without coming quickly to the end of their tether. Furthermore, while the initial expense of electrical appliances is high, that is not the only drawback householders find to their adoption and use. The cost of current, the unreliability of the apparatus, and the lower heat value for money expended than is secured by other heating agents are matters that are getting so well understood by people (through the domestic experiments that have been made to the detriment of the experimentalists' pockets) that the difficulties of making notable progress are great. Certain gas undertakings are finding, now that the hire system has in their case been temporarily suppressed, that nearly as many gas appliances are being sold as were let out on hire in the more palmy days. Even in those cases there will be a reversion to the hire system when the time is favourable; and when the return is made, it will be on better terms than electrical appliances can offer.

German Plant.

Reverting to the offer of a German 10,000 KW. generating set for Sheffield at a price of £49,000, while the lowest tender in this country was between £90,000 and £100,000, when that offer was made conditions here were very unfavourable. Since then, the miners' strike has come to an end; the difference over wages in the engineering trades has been settled; and, generally speaking, trade union leaders realize that there will not be much employment in this country for would-be workers if wages are maintained, and shortened hours and reduced output are persisted in. In view of the changed outlook, the Corporation Electricity Committee asked permission of the City Council to take-back the proposal to buy German plant, in order to enable a revision of tenders at home. It does make one a bit sore to see work provided for Germany that ought to be done at home by Britishers, if reasonable conditions exist. At the same time, it does not assist the country's economy to be paying twice as much for a piece of plant, because unreasonable conditions exist among its workers, which conditions also put this country at a disadvantage competitively.

Mis-Registration.

We take these interesting particulars from the "Electrical Review," which originally extracted them from the "Electrical World." They refer to inaccurate electric meter registration, which is rather a well-ingrained fault of such meters. In one case the current transformers were of the wrong ratio; and for three years the meter registered only 50 p.ct. of the load, involving a loss of $10,000. In another instance the wrong gear train was used in a meter on a 400 KW. load, under-registering by 50 p.ct.; and this condition existed for years. Two-phase supply with three-wire and four-wire connections offers openings for metering errors. In one instance, a consumer challenged his meter reading; and the meter was tested and found correct. It was observed, however, that the meter recorded one-third of the normal load when no load was on. Investigation revealed the fact that on the consumer's side of the meter the connections were three-wire. This would not have affected the meter in the ordinary way; but it happened that another consumer was supplied from the same transformer on the four-wire system, and by accident one wire of each phase was interchanged with the other. The result was that the two phases on this consumer's premises were in series; but the connection of the two phases on the other consumer's circuit enabled the motors to run satisfactorily, while one meter ran at half speed and the other, which gave rise to the complaint, ran 50 p.ct. fast. Lastly, on a load of about 500 H.P., the series coils of an indicating wattmeter were connected in parallel with the series coils of a watt-hour meter, and the latter ran about 50 p.ct. slow for no less than fifteen years before the error was discovered. The gibes of our electrical friends at the gas-meter pale before such facts as these.

SCOTTISH JUNIOR GAS ASSOCIATION

(EASTERN DISTRICT.)

Annual General Meeting.

The postponed Annual General Meeting of the Association was, as already intimated, held on Saturday, the 23rd ult., in the Heriot Watt College, Edinburgh.

After the address by Mr. John W. M'Lusky, General Manager to the Glasgow Corporation Gas Department [*ante*, p. 219],

Mr. R. L. LAING (Brechin), in proposing a hearty vote of thanks to Mr. M'Lusky, pointed out that, beyond the bounds of Glasgow and Edinburgh, there was very little in the way of technical instruction for the members of the Junior Gas Associations; and he asked if a lead from the Senior Associations would not result in some little more attention being given at other centres, in the way of classes to assist students for the examinations of the City and Guilds of London Institute.

Mr. M'LUSKY remarked that it was usually the case that an enthusiastic student managed to provide ways and means for his own education; but he promised to bring the matter before the senior meeting at the earliest opportunity.

The members accorded Mr. M'Lusky a very hearty vote of thanks.

The PRESIDENT (Mr. D. Campbell, of Anstruther) then delivered his Presidential Address, which was given on p. 218 of last week's "JOURNAL." Some interesting slides were shown illustrating the points brought out.

The address was cordially received; and the President was thanked for the careful and painstaking way in which he had prepared it.

The following office-bearers were elected:

President.—Mr. Alex. M'Donald (Prestonpans).
Vice President.—Mr. W. A. Dearden (Dunfermline).
Hon. Secretary and Treasurer.—Mr. R. L. Laing (Brechin).

Mr. J. G. Farquhar (Edinburgh) intimated his retirement from the post of Auditor, which he had held jointly with Mr. J. Davie since the start of the Association. It was decided to insert in the minutes an appreciation of Mr. Farquhar's services. Mr. John Anderson and Mr. J. Davie were appointed Auditors. Messrs. H. Rule, E. L. Farquhar, and T. M. Duncan were elected to fill the vacancies on the Council.

Sulphate of Ammonia Plant at Leamington.—There appeared in "Engineering" for the 22nd ult. a fully illustrated detailed description of a compact and efficient sulphate of ammonia plant, designed and constructed by Messrs. Thomas Piggott & Co., Ltd., of Spring Hill, Birmingham, for the Leamington Priors Gas Company. The capacity is from 3 to 4 tons of sulphate of ammonia per day; and two men only are required for its complete operation. Excluding the lime house and sulphate store, a room 20 ft. wide by 24 ft. 6 in. long and 18 ft. high will accommodate all the apparatus but a small atmospheric condenser, which is naturally put outside. The acid store tank is also placed out of doors; and the acid supply tank is situated on the roof of the lime house. The pre-heater is of Messrs. Piggott's "Atlas" type. Our contemporary remarks that this full description is given because it exemplifies modern practice in the manufacture of sulphate of ammonia. The plant has been in operation for some months, and has given entire satisfaction. It is added that "the efficiency of abstraction of ammonia is very high; the plant producing, on an average of a three months' run, no less than 26·2 lbs. of sulphate of ammonia per ton of coal carbonized. This is highly creditable to Mr. J. R. Marsden, Messrs. Piggott's Chemical Engineer, who designed the plant, and also to Mr. R. S. Ramsden, the Engineer and General Manager of the Leamington Priors Gas Company, for the way in which it is operated."

THE VAPORIZATION OF PARAFFIN IN COAL GAS.

By NORMAN SWINDIN, A.M.I.Mech.E.

THE removal from coal gas of benzole, toluole, and the lighter hydrocarbons is now general gas-works practice. Although the operation began as a war measure, the growing demand for petrol substitutes—fuel oils and high quality benzole, for the organic chemical industry—has continued; so that gas-stripping may be regarded as a permanent feature of gas-works practice. Much of this stripping has been and is roughly performed in extemporized plant; consequently only a portion of the benzole content of the gas is removed. To-day it may be taken that greater efficiency is sought, bringing with it difficulties which now tax the resources of the gas engineer.

The two great difficulties in the distribution of coal gas are the condensation of water in the syphons (with the resulting scaling of the pipe systems) and the deposition of naphthalene in the services, stopping them up and preventing the desired flow of gas. The naphthalene trouble always existed; but a gas rich in hydrocarbons conveyed the naphthalene to the consumer, as it maintained its gaseous (or rather vapourous) state through the usual range of temperature. In other words, naphthalene is soluble in its homologues—benzole, toluole, &c. The removal of the lighter hydrocarbons causes the naphthalene to be deposited as soon as the gas is cooled to the normal temperature of the street-mains. These naphthalene carriers, as the hydrocarbons may be called, have, therefore, to be replaced by other substances which, when vaporized, will carry along with them the naphthalene in the gas. Of these substitutes, commercial paraffin oil is the most satisfactory and the cheapest.

The vaporization of paraffin oil at ordinary temperatures is, however, performed with great difficulty. The writer recently carried out some researches designed to ascertain the conditions under which the permanent vaporization of paraffin oil could best take place. In the first place, the vapour tension of ordinary commercial paraffin oil was carefully measured for a range of temperatures between 15° and 90° C. The result plotted gives the Curve A—fig. 1. The corresponding tensions of water are also shown in Curve B; and comparison of the curves brings out clearly the permanent character of the paraffin oil. The apparatus in which the experiments were carried out consisted of a barometer tube surrounded by a water bath, 2 in. diameter. No special precautions were taken to remove the last traces of water from the mercury; but a blind experiment [No. 1] was made to ascertain the absolute height of the mercury column for the various temperatures. Thus:

EXPERIMENT NO. 1.

Temperature °C.		Height of Mercury Column.
15	..	29·22 inches.
25	..	28·97 ,,
35	..	28·73 ,,
45	..	28·51 ,,
55	..	28·28 ,,
65	..	28·03 ,,

EXPERIMENT NO. 2.

Paraffin oil was now introduced into the same barometer tube as in experiment No. 1, while the temperature was still raised. The water bath was cooled, and the following results obtained:

Temperature °C.	Height of Mercury Column.	Height of Mercury Column. Experiment No. 1.	Difference.
	Inches.		
15	28·25	29·22	0·97
25	27·75	28·97	1·22
35	27·33	28·73	1·40
45	26·96	28·51	1·55
55	26·63	28·28	1·65
65	26·31	28·03	1·72

The figures in the fourth column give the tensions (in inches of mercury) of paraffin, and are plotted as Curve A, fig. 1, already referred to.

EXPERIMENT NO. 3.

As it is generally known that, in practice, the presence of water vapour hinders the vaporization of paraffin oil, this experiment was tried to ascertain the extent of the hindrance. Accordingly, the same barometer tube, containing paraffin oil and its vapour and mercury column, was then saturated with water vapour, and the temperature raised and was then lowered. The results were:

Temp. °C.	(A) Absolute Height of Mercury Column.	(B) Vapour Tension of Water at this Temperature °C.	(C) (A) and (B).	(D) Difference between Column (C) and 28·48 Inches (15° C.).
	Inches.	Inches.		Inches.
16 . . .	27·98	0·53	28·51	..
39 . . .	26·38	2·05	28·43	0·05
51 . . .	24·58	3·80	28·38	0·10
48 . . .	25·18	3·28	28·46	0·02
41·5 . . .	26·13	2·34	28·47	0·01
31 . . .	27·12	1·31	28·43	0·05
24 . . .	27·53	0·87	28·40	0·08
13·5 . . .	27·98	0·45	28·43	..

The slight difference in height occurring at the same temperature is no doubt due to the fact that, on raising the temperature, the pressure observed would be slightly less than the correct pressure; while, on cooling, the observed pressure would be higher. The figures in Column (C) in this table show that paraffin oil will not vaporize at all in the presence of saturated water vapour, and that if water be introduced into a space containing the vapour of paraffin oil, the latter will condense and the water will vaporize until the space is saturated with water vapour.

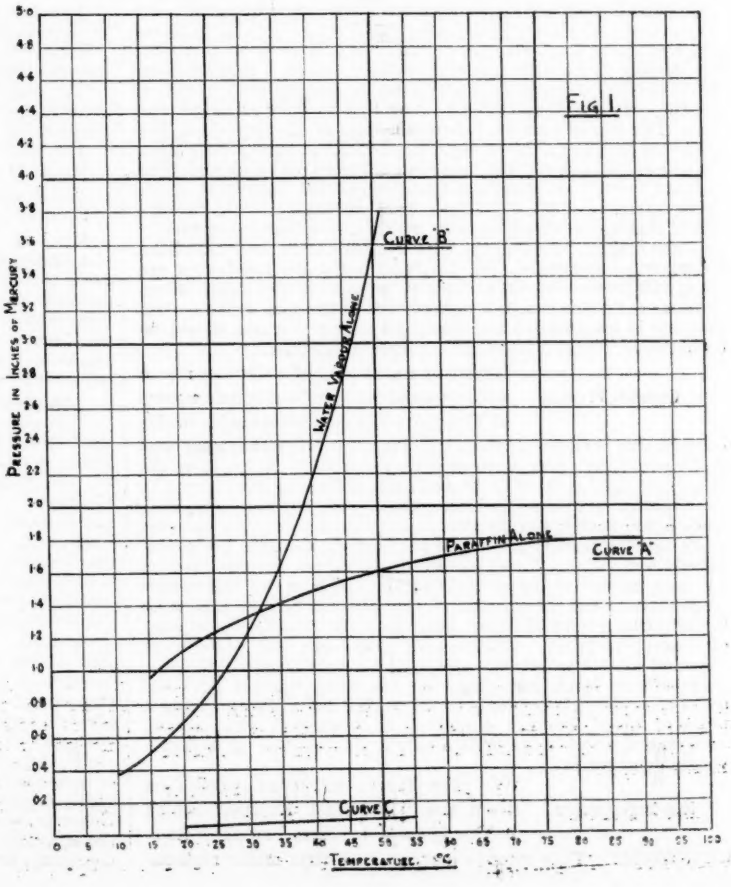
The conclusions to be drawn from these experiments are that paraffin oil will not vaporize in the presence of saturated water vapour at any temperature, and that temperatures below that of the boiling point of water have little effect on the vaporization of paraffin oil.

A further set of experiments was afterwards carried-out to determine the rate at which paraffin oil vaporizes in ordinary air at all temperatures to distillation.

EXPERIMENT NO. 4.

This was a distillation test of ordinary commercial paraffin oil, the ascertaining of the temperatures and times to distil 10 c.c. of the oil from the mass. Thus:

Time for 10 c.c. to distil in minutes . .	2	2	2½	1	1½	1	2½	1½	2½	6
Temperature °C. of distillation	176	184	198	204	216	224	232	244	260	265



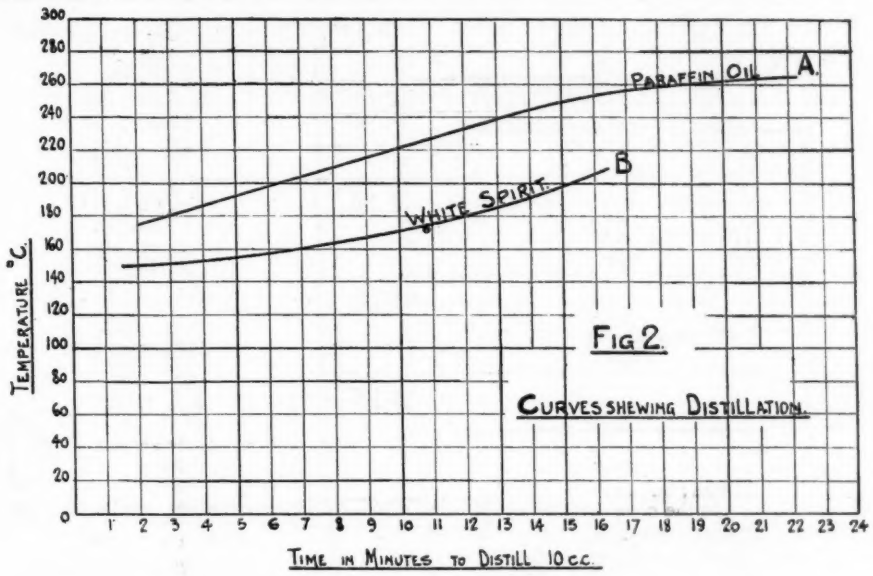


FIG 2.

CURVES SHEWING DISTILLATION.

The figures are graphed and smoothed-out by Curve A in fig. 2. They indicate the composition of the oil, but form no guide as to the vaporization below the distillation temperatures. Curve B, fig. 2, gives the corresponding curve for white spirit.

EXPERIMENT NO. 5.

In order to determine the rate of vaporization of oil below its distillation point, a dish 15 cm. in diameter, was carefully suspended from a balance filled with oil and weighed. The temperature of the oil was raised and kept constant and after definite intervals of time the dish was weighed again. The loss in weight was stated in kilos. of oil vaporized per square metre per hour at the temperature. The following figures give this loss in weight at various temperatures. Thus:

Temp. °C.	Time—Minutes.	Loss in Grams.	Loss in Weight in Kilos. per Sq. Metre per Hour.
115	5·87	10	5·77
93	13·5	10	2·51
76	37·0	10	0·92
51	53·0	3	0·19
39	117·0	3	0·09

Surface of evaporation, 15 cm. dia. = 0·01768 sq.m.

The figures are graphed and smoothed-out by Curve A, fig. 3. Curve B, fig. 3, gives the corresponding curve for white spirit. A glance at these curves indicates how little oil is vaporized at the temperature of the ordinary gas-main—*i.e.*, 20° C.

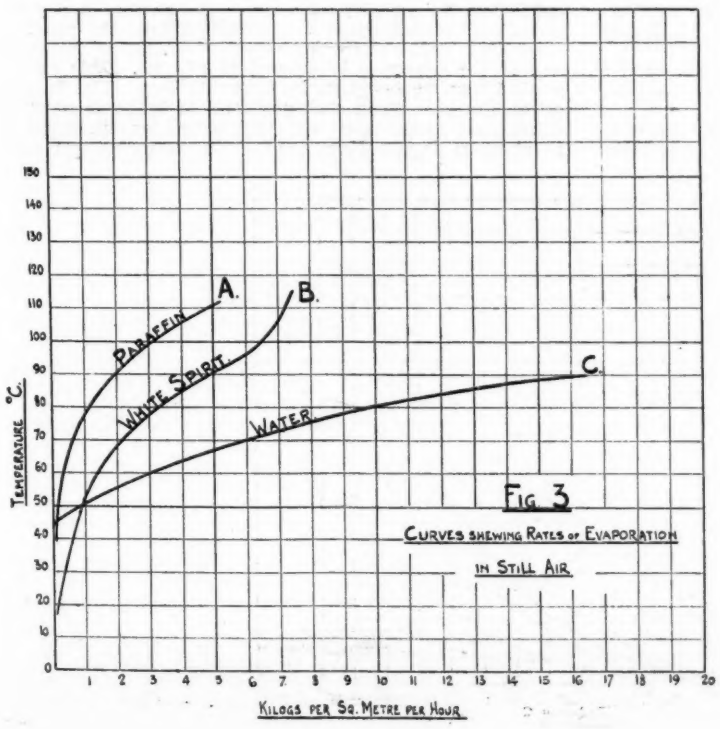


FIG. 3

CURVES SHEWING RATES OF EVAPORATION IN STILL AIR.

In studying the various types of vaporizers on the market, one is struck by the lack of physical knowledge shown by the inventors. The mechanical turn of mind is uppermost, with the result that the plant is overloaded with mechanical gear, and also that steam is generally used the wrong way.

There seem to be two types of plant in use in the ordinary works. One type vaporizing by heating the oil and passing the hot vapour into the gas stream, the other type carrying out the operation by heating a portion of the gas stream, and passing this stream over the surface of paraffin oil. Both methods are faulty. The first because the hot vapours, on passing suddenly into the cooler gas stream, are condensed, and more so if the gas is saturated with water vapour, which it usually is on leaving the works. The second method, though an improvement, fails because the heating of the gas merely serves to raise the saturation point of the shunt stream of gas for a short time only. On joining the main stream, most of the oil vapour carried along is thrown down.

The effect of temperature evidently is simply to raise the saturation point of the water vapour in the gas in order to leave room for the paraffin vapour. On cooling, as the gas is bound to do in the street-mains, the water vapour is brought down to the saturation point, when the oil vapour at once deposits. The only real method of vaporizing paraffin oil permanently in the gas is based, first, on the removal of the water vapour by some form of dryer, and second on the passage of this dried gas over large surfaces of oil in films at normal temperature. The application of heat in both these operations is not only unnecessary but wrong. Most of the water can be removed by cooling and separating the mist particles. At ordinary temperatures, ordinary dry coal gas can absorb 18 gallons of oil vapour per million cubic feet without subsequent deposition. It is, therefore, useless to gasify or vaporize more oil than the gas will naturally take-up; for the excess oil is only deposited and lost. Accordingly, it is useless to heat either the oil or the gas to bring about this excessive vaporization.

In order to try-out these principles on a fairly large working scale, the writer designed a vaporizer in which large surfaces of paraffin oil were disposed in the form of films. Over these films of oil the gas, previously dried by cooling, was passed; the vaporization taking place at low temperatures. The vaporizer* consisted of four 6-in. cast-iron main pipes 4 ft. long, superimposed one on the other, and each provided with branch pipes at right angles and connected together so that a current of gas could pass upward through each pipe in series. In each of the main pipes was inserted a 1½-in. wrought-iron steam pipe provided with a treble fin, and held in position by a flange with which it was bolted to one of the end flanges of the main pipes. A paraffin oil distributing tray was placed on top of each finned steam-pipe, and through a set of lips and notches the oil was caused to flow by capilliarity through specially designed wires on to the fins of the steam-pipes. The excess oil was collected at the bottom of the main pipe, and escaped through a seal (bolted to the side) into the distributing tray of the next lower main pipe. The gas in passing through the main pipes was constrained to screw itself along the threaded fins on the steam pipe which were always kept wetted with oil. This description, read with reference to

* British Patent, No. 14,093 of 1916.

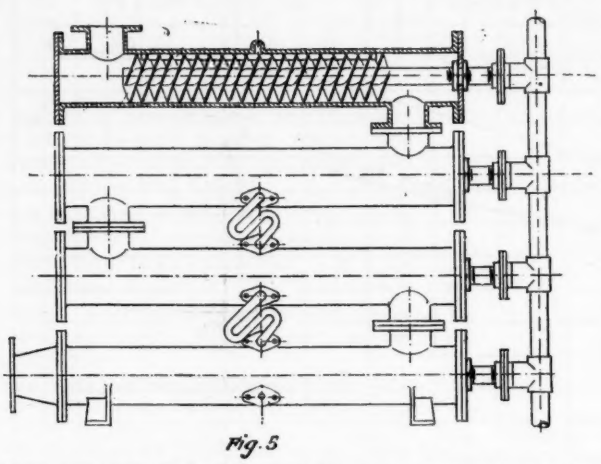


Fig. 5

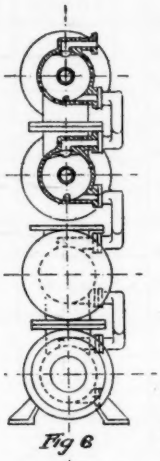


Fig 6

Fig. 7

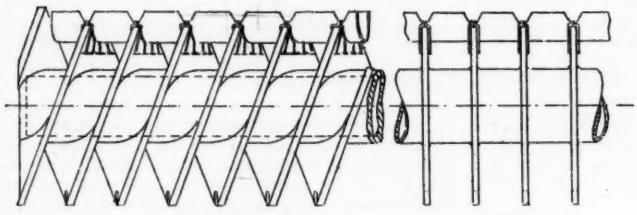


Fig. 8.

Fig. 9.

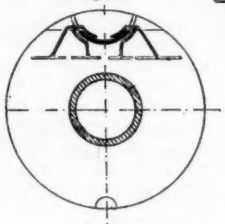


Fig. 10.

the illustrations figs. 5, 6, 7, 8, 9, 10, conveys a general idea of the apparatus. The adoption of the helical fin, instead of staggered baffle-plates, was due to the desire to obtain a maximum surface with the minimum resistance to the flow of the gas. The staggered baffle-plates would, of course, cause the gas to eddy, and increase the pressure required in the mains. The chief feature of the design is the method used to distribute a continuous film of oil on the vertical surfaces of the helix. The capilliary wires work so smoothly that at no time is there more than ¼ in. oil in the distributing trays; for, as soon as the oil reaches the wires lying in the tray, it is drawn up and syphoned over on to each side of every fin. There is, therefore, no necessity for the absolute levelling of the apparatus, provided the bottom of the trays are covered with oil. Without these wires, the lips would have to be dead-level, and very carefully machined, for it is known that slight differences in the surface of the lips affect the formation of drops. The wires avoid these delicate surface-tension effects.

When first the apparatus was installed, the gas was not previously cooled; and it was thus early discovered that it was an excellent cooler. It was found that the volume of the oil discharged from the apparatus exceeded the quantity charged in. On examination, the excess quantity proved to be water, confirming (on a large scale) the truth of the results indicated on Chart No. 1—that oil will not vaporize in the presence of saturated water vapour.

The next table gives the results of carefully-made tests carried out in the hot summer months on the apparatus, passing gas under 1-in. water-gauge pressure.

Oil Vaporized Gallons per 24 Hours.	Temperatures.		Gas Passed C.Ft. per Hour.	Oil Vaporized per 1,000,000, C.Ft. Gallons.
	Inlet.	Outlet.		
	° F.	° F.		
*Nil**	61	64	15,000	..
5 3	70	100	15,000	14·75
21·0	70	140	15,000	58·5
37·0	70	170	15,000	102·0
5·28	64	96	15,000	14·70
3 96	70	80	16,700	9 9
1 32	70	76½	15,000	3·67
Nil†	69	74		
		68	15,000	..
10	69	105	26,000	16·0
3 2	67	71	23,600	5·65

* Condensation of water took place here; the temperature being too low.

† Besides condensation taking place, the gas was actually cooled in passing through the apparatus.

The following figures and results are graphed by curves in fig. 11. Curve A gives the quantity of oil in gallons per 24 hours vaporized when 15,000 c.ft. of gas is passed per hour. Curves B and C show the quantity when 21,000 and 26,000 c.ft. of gas are passed per hour respectively. Curve D indicates the quantity of oil which is capable of being vaporized, assuming the surface area of the apparatus is exposed to still air. This curve is graphed from figures given by Curve A, fig. 3. The foregoing information is given in a simpler form in fig. 12, on which the ordinates are gallons of oil vaporized per million c.ft. of gas and the abscissæ degrees Fahr. and C. The maximum quantity of

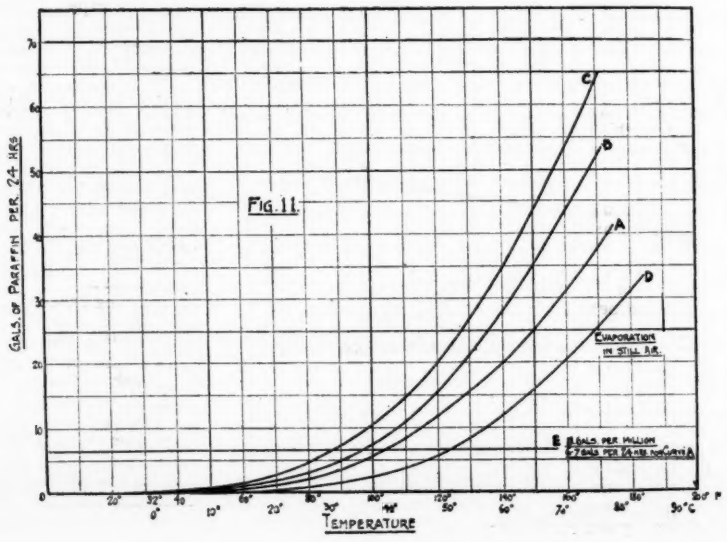
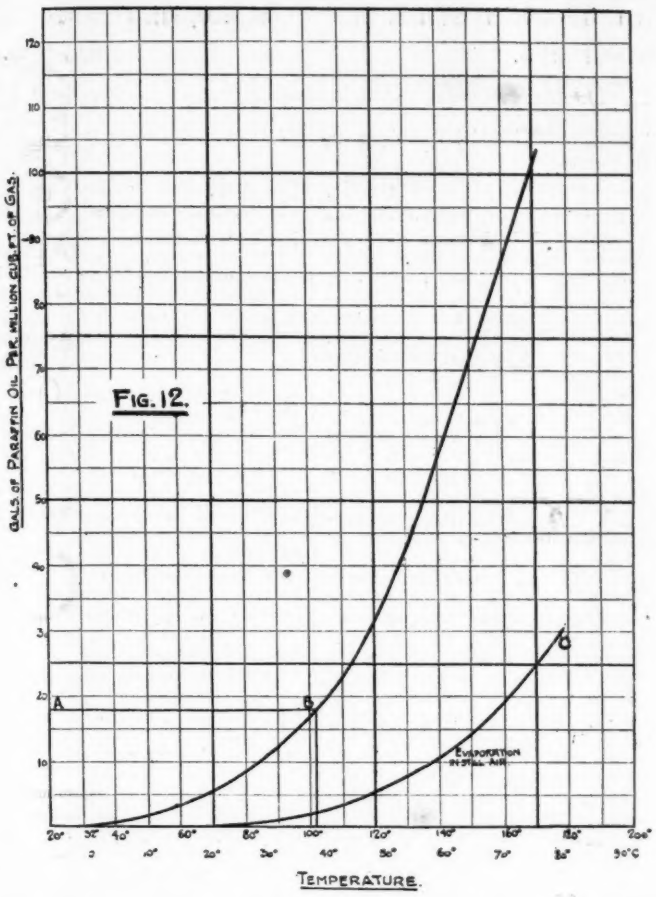


FIG. 11.



oil which the dry gas can absorb at normal temperatures is 18 gallons per million c.ft. Any vaporization above this is useless, as the oil vapour will only condense in the mains after leaving the hot apparatus. The line A B in fig. 12 indicates this maximum value. The curve crosses this line at the point B which shows that the gas requires heating to about 100° Fahr. in order to raise the saturation point of the water to provide space for the oil. Now if the gas were dry, no heating would be necessary—the gas at its normal temperature, 63° Fahr., absorbing 18 gallons of oil per million c.ft.

To sum up then, paraffin oil of commerce cannot be vaporized in a current of coal gas in the presence of saturated water vapour Dry coal gas of average composition will absorb as vapour about 18 gallons of oil per million c.ft. at normal temperatures—say, 60° Fahr. It is therefore useless to vaporize more than this quantity of oil by raising the temperature of either the gas or the oil, because on cooling to 60° Fahr., the excess oil is deposited and lost. It is advisable to dry the gas before passing it on to the oil vaporizer. At 60° Fahr. (fig. 12) only 4 gallons of oil per million c.ft. are vaporized instead of 18 gallons. The cooling of the gas takes place easily in the same form of apparatus as vaporization, conducing to simplicity of working.

OXIDE PURIFICATION.

By GEOFFREY WEYMAN, D.Sc.

The publication of the report of the Chief Alkali Inspector for 1920 brings fresh knowledge as to the behaviour of oxide of iron in the presence of hydrogen sulphide and oxygen.

Chemists engaged in the gas industry will have already realized that the progress of chemistry must affect their particular sphere, just as it penetrates every other branch of industry. No subject has recently engaged more attention, or given more important results, than the subject of catalysis. By catalysis we can concentrate plant, save time, labour, and energy, and work under conditions more nearly approaching normal. Probably nothing is more striking as an example of this than the tiny and compact apparatus for producing "nitre" gases by the catalytic oxidation of ammonia, which is now often to be seen working silently and unattended in some corner near the huge acid chambers in which the "nitre" gases themselves function as catalysts in oxidizing the sulphur dioxide from burning spent oxide.

In the gas-works the first stage of the oxidizing reactions which lead to the production of sulphuric acid also take place by catalysis. Without the presence of the iron oxide, the temperature necessary to oxidize the hydrogen sulphide would have to be raised to an impossible extent. Recent research into catalytic actions has shown that, if foreign substances are present, some may promote the reaction, some may poison the catalyst. Both the gas and the oxide of iron used are largely diluted with some foreign substances, the effect of which we only know in the aggregate.

If the catalyst could be made more energetic, and the reactions thus accelerated, purifying area and the attendant expenses would be reduced. Failing this, recourse must be had to higher temperature conditions to accelerate the reactions. Unfortunately, the concentration of the reacting gases is very low—particularly so in coal gas; and the heat developed by the reactions, which is practically the only means available for raising the temperature, may be insufficient. Owing to the natural tendency of gas engineers to reduce or fail to keep the purifying area above the lowest possible limit, the chemist is often hard put to it to find either a strong enough catalyst or a high enough temperature. Many of the larger concerns have far less than the 0·5 sq. ft. per 1000 c.ft. purifying area recommended by the Chief Alkali Inspector, and are corrrespondingly anxious as to the provision of suitable catalysts. Hence the experiments reported by the Alkali Inspector will be very welcome.

There does not seem to be any essential difference between the "Claus" reaction and that usually carried out in coal-gas purification, except that the latter reaction is carried out at a slower rate, with consequent isolation of intermediate products—the sulphides. It is interesting to find in the material examined that the actual reaction velocity is sufficiently great to render the intermediate products invisible when oxygen is present, though the coloration with hydrogen sulphide alone is an indication that such are momentarily formed. The material used was not apparently the ordinary "burnt" spent oxide such as we know it.

Unfortunately, the strong catalytic effect shown to exist in the "burnt" oxide dies rapidly away—perhaps because it applies only to a portion of the material. The effect of a decrease in the concentration of the reacting gases and an increase in the nitrogen is very marked, and suggests that with only the 1 or 2 p.ct. of hydrogen sulphide found in practice, the catalytic activity might be appreciably reduced. On the other hand, when the material was aërated before a fresh exposure, the very striking increase in activity hints at the formation of a poison which is destroyed by strong aëration. The presence of so much foreign matter, as the report says, makes it impossible to state what part the individual constituents play. Possibly, if pure ferric oxide could be prepared of the same chemical and physical composition as the oxide existing in the material, and examined, some knowledge on the point might be obtained.

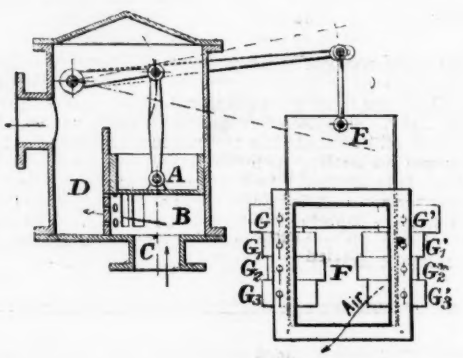
AUTOMATIC CONTROL OF COMBUSTION IN STEAM BOILERS.

By M. FRÈRE.

[A Paper read at the Tours Meeting of the Société Technique du Gaz en France.]

The author briefly reviewed the systems which have been described or adopted for providing more or less completely for the automatic control of the combustion of fuel under a steam-boiler by means of the generation of steam in the latter. In this connection, he referred to the MacLean system, better known in France as the "tirage équilibré Hotchkiss." Other inventors—Osborne, Gibson, and Ridderstedt—have sought to achieve automatic regulation of the furnace by somewhat similar means. M. Frère based his experiments on the assumption that for effecting the automatic control of the combustion of the fuel—that is to say, the admission of air to the furnace—the best way is on the basis of the heat carried off by the steam and requiring to be immediately replaced. But while measures of such heat-flux are not practicable, the measurement of the weight or volume under constant pressure of the steam is sufficient accurately to gauge the heat contained in it. On this basis, his system is embodied essentially in a steam-measuring device, a fan working at substantially constant pressure, and a regulator or damper of the air supply to the fan.

The steam measurer consists of a piston A, moving in a cylinder B, perforated by small and larger apertures. The steam entering at C passes through the uncovered apertures and escapes at D. The surface and balance weight of the piston are such that it takes up 50 gms. per sq. cm.—the steam passing through the apertures under this constant loss of pressure. Any increase of the steam-pressure causes the piston to rise, uncovering a greater area of the passage, and *vice versa*. The movements of the piston—equivalent to the admission of steam to an engine—can be registered in order to indicate at any instant the consumption of steam as a percentage of the maximum power of the boiler. The device is thus a valuable instrument, since it informs the stoker if he requires to increase the feed of water or of fuel and air, or if he needs to intensify his fire.



But by connecting the piston by means of a series of levers, as shown in the engraving with the damper E of the air-passage F placed in the conduit of the blower, direct and automatic regulation of the supply of air proportionately to the production of steam may be achieved. Adjustable shutters G, G^1, G^2, G^3, &c., provide for the appropriate reduction of the air in the air passage so as to meet different rates of working for different efficiencies of furnace or blower, variations in pressure of blower, &c.

If now the pressure at the inlet to the steam measurer falls, the quantity of steam required will be of slightly greater weight. The piston A, taking up regularly its 50 gms., uncovers a greater section of passage for the steam, with the result that the damper E is raised and combustion accelerated. The contrary takes place if the pressure tends to rise, so that the air damper controlled by the steam production is a corrector of the pressure in a more delicate and sensitive manner than with devices controlled directly by pressure.

In these circumstances, the stoker has only to see that the fuel is uniformly charged, and in sufficient quantity to maintain the water-level, to adjust the damper of the spent gases in order to equalize any depression in the furnace, and to remove clinker. If he keeps the thickness of the fuel layer proportional to the rate of the air supply, and avoids sudden spurts of flame, the combustion should approximate to the ideal—12 p.ct. of CO_2 in the products of combustion.

During the past two years, numerous tests have been applied to apparatus working on this system. M. Décluy, from analysis of the gas made during the running of a furnace, found an improvement in combustion—the spent gases containing from 9 to 13 p.ct. of CO_2, and the steam pressure (despite great variations in production) not varying more than 5 or 7 p.ct. from the mean. Official tests by the Association des Appareils à Vapeur de la Somme have shown a fuel economy of 13·4 p.ct.

MANAGEMENT AND REPAIR OF FURNACES IN SMALL GAS-WORKS.

By M. CHANGARNIER.

[A Communication to the Tours Congress of the Société Technique du Gaz.]

The object of the communication was to bring together a volume of practical experience in the supervision of the carbonization plant employed in small works. The author emphasized at the outset that he knows of no manual which adequately supplies this description of help to working managers in charge of furnaces designed on a much more modest scale than those of the large undertakings; and he put in very comprehensible form a large mass of knowledge gathered from practical experience.

FURNACES.

In the ordinary furnace for seven retorts, he points out that the furnace proper has a length of about 80 cm. (30 in.); those for three and five retorts being often of the same dimensions. Hence it is not surprising that the furnace, when used for the smaller number of retorts, should be regarded as of remarkable efficiency. Such small furnaces may be modified with advantage as follows: Instead of placing the bars horizontally, as is commonly done, they may be inclined at a considerable angle. The capacity of the furnace will be greater, and its production of heat correspondingly increased. Also, the inclined position of the bars greatly facilitates the work of the stoker in clearing clinker. The declinkering tool would be held at about the same angle as the furnace bars and so be moved on them with less effort. Also, a certain leverage is obtained, which relieves the stoker to some extent of constantly stooping in his work.

Modification of the flame passages according to a plan adopted by the Société du Gaz du Nord et de l'Est, and employed by M. Changarnier for many years, has been found to give excellent results. In a furnace for five retorts, the two retorts placed to the right and left of the central one (in a furnace for seven or nine retorts, those in the lower position) are invariably at a lower temperature than the others. This arrangement is a faulty one, for the reason that, in consequence of the restricted area of the passages, the hot gases travel much more quickly and are not allowed time to give up a due proportion of their heat to the retorts below which they pass. The alteration of the arrangement consists in dispensing altogether with the separating walls, by causing the flames to emerge at the back instead of at the front and by arranging dampers at the centre of the new passage. If this alteration is made, the flames on entering find themselves in a large space and thus remain longer in contact with the retorts. It may be objected that by dispensing with the longitudinal walls placed under the two bottom retorts and axially with them, with the same draught and opening of damper, no greater quantity of heat is supplied. Theoretically, this may be the case; but, in practice, the alteration suggested is advantageous. But, owing to the removal of the longitudinal wall, the retort is not so well supported; and it is advisable to increase slightly the thickness of the side walls.

The removal of the dividing walls involves a further modification. Since the flames now pass to the back of the furnace, all of them will be concentrated in this part of the furnace, so that the retorts become very hot at the end and less heated at the head. Hence the flames require to be directed towards the head. To secure this, half-way along the length of the furnace (starting from the back) bricks are placed so that they bear downwards upon the upper retort and upwards upon the arch. The flames of the furnace, after having surrounded the middle retort, encounter this chequer brickwork, and are caused to travel towards the head of the retort in order to reach the only free passages.

In setting-up a furnace, seven or eight of the first bricks should be fixed with grout, which affords a dividing wall, fitting closely above and below. As regards the next three or four bricks, they are simply laid by hand, without grout, following the others. When starting the furnace, if it is found that the heating is too great at the head of the retort and not enough at the back, all that has to be done is to take away the latter bricks, as can be done with a length of iron tube thrust through an aperture in the front of the furnace. After at least a day's running of the furnace, if it is found that the heat is still too great at the head, still other bricks are removed, though it is seldom necessary to remove more than three bricks from each side. The latter, after having been dislodged, have no ill-effect; they are left lying on the top of the two upper retorts.

SETTING-UP A FURNACE.

In small works, it is of distinct advantage to erect the furnaces without outside help, not only on the ground of economy, but for the reason that the work will be better done than under the direction of a stranger. In first taking-down the furnace, careful note should be made of its setting, so as to facilitate the work of re-setting. If the following precautions are observed, this operation will have a successful result. Care should be taken to break the joints of the brickwork. They should never be allowed to coincide, as this would impair the strength of the structure. The joints should be made as thin as possible—not more than 4 to 5 mm. (about $\frac{3}{16}$ in.) for the less heated parts. For

the parts exposed most directly to the heat of the furnace the joints should be thinner still; and for them the trowel should not be used, but a thin grout made-up, in which the part of the brick to receive the joint is dipped, and the brick then placed in position. A joint no thicker than a stiff sheet of paper will thus be obtained.

If the abutments of the furnace are not constructed with special blocks, bricks of good quality and those which have been most strongly fired (as shown by their brown tint) should be used, and placed end to end, so that the fire has a thickness of about 22 cm. (8½ in.) exposed to its action before reaching the joint which connects the first row of bricks with the second. Furnaces constructed with special blocks have a much longer life than those made with bricks, even of the best quality. The arch of the furnace should be made from two rows of 11 cm. (4½ in.) bricks, giving a total thickness of 22 cm. It should not be overlooked that in setting-up the arch a semicircular wooden structure of radius 1 cm. (½ in.) less than the span of the arch should be made to carry slats of 1 cm. thickness, serving as the support of the bricks of the arch during making. The two upper retorts should be slightly inclined—that is to say, the back raised 5 to 7 cm. (2 to 2¾ in.). This facilitates charging with the shovel. The back of the retort requires to be well-packed; as, if this is not done, the constant use of the discharging tool will damage the end of the retort if there is an empty space behind it. Suitable packing consists of whole and broken bricks, provided by the dismantling of the furnace. There is no need to employ pure grout; a mixture of clay with one-third grout is sufficient.

The first four furnace passages should be of smaller dimensions than those at the back, in the ratio of 7 to 11. This difference of opening is necessary on two accounts—first, that the flames traversing the first passages tend to corrode them, and increase their size; and, second, that the gases may distribute themselves as completely as possible within the furnace, so that it is well to have larger passages for the gases above the furnace proper than on the side. The furnace having been erected, the front should be plastered with thin grout, and care taken that no bricks or pieces of rubbish are left in the flame-passages.

Placing the Retorts.

On account of the weight of the retort, the placing of it in position in the furnace requires to be done with considerable care. Good hoisting tackle or a set of pulleys and a strong rope being available, the retort is brought to the front of the furnace on wooden rollers and placed facing the position it is to occupy. A line is marked round its middle point with chalk; and a length of rope taken round this part. There is no fear of the rope slipping, although coiled without a knot, since the weight of the retort keeps the loops of the rope pressed against each other. The hook of the tackle is passed through one of the loops, and the retort raised a little to see that it balances. If it does not, it is allowed to rest again on the ground and the cord pushed one way or the other a short distance to secure a position of balance. When this has been done the hoisting tackle is placed vertically above the point of support.

The seating which is to support the retort has first laid upon it two lengths of flat iron about 50 cm. (20 in.) less in length than the dimension of the setting. The ends of these bars are bent over at right angles, to prevent any slipping of the bars when the retort is in process of being rolled into position. But even when taking all precautions, it sometimes happens that the retort is not properly placed—being either too far on the setting or not far enough, though only to a small extent. This must be remedied, and any want of squareness in mounting (axial positioning of the retort) is also to be remedied.

Adjustment of the Furnace.

The first condition for good functioning of any furnace is the correct adjustment of the draught. Usually the draught produced by the chimney stack of the works is much stronger than is required. It is reduced by closing the furnace dampers more or less, which adjustment has to be found by a series of trials. At the start the dampers are opened 5 cm. (2 in.) and the temperature of the furnace noted during twelve hours. If it is too low, the dampers are opened a further 1 cm. (about ½ in.), and observation kept during six hours. If at the end of this time there is an improvement in the temperature, the dampers are further adjusted to secure the desired result. While at a rough glance it is difficult to tell if a furnace is getting too much draught, it is easy to see if it is not getting enough. For this latter purpose, a small plug is taken out from the front; and if flame escapes from the aperture, there is evidently too little draught, or rather a back-draught. The dampers require to be opened until this back-draught ceases, and the successive tests then made with this position of the dampers as the starting point.

It will sometimes be found that one side of the furnace is hotter than the other. In this case the dampers on the colder side require to be manipulated as already mentioned. As a rule, the difference of opening between two dampers of equal sectional area on the same furnace does not vary by more than 1 to 2 cm. The dampers having been once adjusted, they should remain unaltered during the entire working of the furnace. On no consideration should they be altered. If the temperature falls, the fall has nothing to do with the degree of opening of the dampers; the cause must be sought elsewhere.

As a rule, by inserting an iron pipe (to the end of which a water manometer is fitted) into one of the lower passages of the furnace, it will be found that there is a reduced pressure from 3 to 5 mm. The ordinary water manometer of U form is not sufficiently sensitive for the accurate indication of such low degrees of exhaust as a few millimetres. A manometer of the inclined tube pattern is better, and can be readily constructed as follows: A receptacle of sheet lead or copper is provided with an opening for the introduction of water and with a tube to which is attached a rubber pipe connected to an iron pipe introduced into the lower passage of the furnace. The container has a hole in it to which is soldered a short copper pipe of greater diameter than the outside diameter of the glass tube. This latter tube is inserted in the short copper tube, and the joint sealed with fine modelling plaster or sealing wax. The whole apparatus is fixed on a board placed on the wall in a horizontal position. The inclination of the glass tube to the horizontal should be 1 : 10, so that the graduation of the scale, in centimetres, on the inclined tube actually indicates millimetres. The instrument is sensitive, since it indicates $\frac{1}{10}$th of the actual differences of pressure.

Working of Furnaces.

We now come to keeping the furnace in a good working state, once it has been adjusted. This means maintaining a sufficient layer of fuel, keeping the bars clean, and removing clinker. Clinker should be removed every six hours, and also one hour before charging, so that the fire shall be at full strength at the time of charging. In order that there may be as little fuel as possible when removing clinker, the furnace should be charged somewhat less during the preceding hour. The fuel having been pushed on to the hearth with a tool, the clinker on the bars is dislodged, raised with the de-clinkering tool and withdrawn from the furnace with a scraper similar to that used for discharging the retorts, but of smaller size. Every care should be taken to remove all the clinker attached to the abutments of the furnace fabric. The bars having been freed from clinker, the incandescent coke is drawn back, the furnace door kept closed for a few minutes for the fire to regain its strength, and the next charge of fuel then delivered.

The furnace should be charged about every hour. During the intervals of removing clinker, the fire needs attention from time to time with a poker—that is to say, the clinker is raised as it forms, and any pieces which can be seen removed if possible. Unless this is done, the furnace would become blocked owing to obstruction of air by the clinker, and the combustion rendered correspondingly bad. The bars of the furnace and the fire itself should always be visible by reflection in the ashpan water.

There would, of course, be an advantage in closing the dampers completely during the removal of clinker, so avoiding the entrance of air. But this is too much to expect of stokers; they would do it once or twice and that would be all, as the opening and closing of all the dampers certainly involves a fair amount of trouble. But the same result may be obtained much more simply by fitting (if there is not one already there) a large damper on the passage leading immediately to the chimney stack. This damper may be formed of a cast-iron plate sliding in two grooves arranged inside the passage. The plate is suspended by a metal cable taken over a small pulley and carried to a counterweight, attached to which is a pointer moving against a graduated scale, so as to allow of the auxiliary damper being returned exactly to its original position after the removal of the clinker.

As mentioned, the furnace hearth should be kept clean, and not encumbered with coke; otherwise a mass of clinker is quickly formed and continues to increase in size, obstructing the furnace. If, from any cause, such a mass is formed it is absolutely necessary to remove it, for which purpose the fire is urged by fully opening all the dampers. The furnace then becomes white hot, and the mass of clinker is converted into slag. By means of such a scraper as is used for discharging retorts, this slag is brought on to the bars and got rid of when removing the clinker. In order that the scraper shall cut into the soft clinker, the tool requires to be cold, or it will slip over the surface. Therefore, several scrapers should be at hand, and a change made as soon as it is felt to be necessary.

As regards starting the fire, according to theory one should proceed very slowly—first with the dampers closed, and opening a plug on the upper part of the furnace front to give a little draught; then lighting a coal fire; and after twenty-four hours opening the dampers. But this method of lighting requires at least six days to bring the furnace to the required temperature. While the object of the method is to increase the heat steadily, so as to avoid injury to the retorts or fabric of the furnace by sudden variations, long experience has shown that exactly the opposite plan—namely, starting as quickly as possible—is the better in practice. On the first day the dampers may be opened 3 cm. (1¼ in.) and the coke fire started. When it is seen that there is a reddish heat in the furnace, the dampers are opened to 5 cm. (2 in.) and the fire urged. After forty-eight hours at the most, the furnace will be fully working.

Before starting the fire, the retorts should be charged not with coal, but with a mixture of coke dust and tar. The tar, by distilling, gives a large amount of combustible vapour to the furnace, owing to the cracks and fissures in the retorts when first taken into use. As it burns, the tar closes up these cracks; and the second charge is made with coal. This, however, yields only about one-third of the normal quantity of gas; the other two-thirds being burnt in the furnace and continuing the closure of

the crevices in the retorts. Loss of gas from the porous condition of new retorts is, of course, not remedied until a coating of carbon has been formed on their internal surfaces by working-off the first charge or so. The third charge should yield the full quantity of gas, or very nearly so. Care should be taken to screw-up the bolts of the retorts after the furnace has been in operation twenty-four hours, since the bolts are slightly extended in length by the heat.

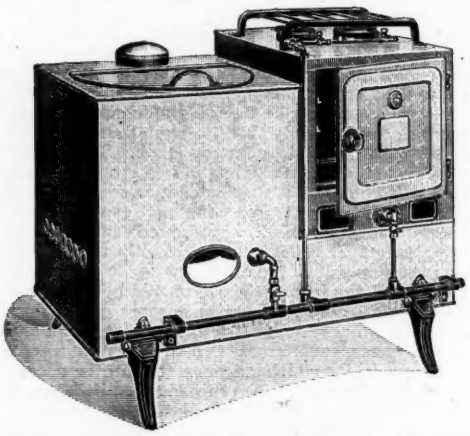
When stopping a furnace, the procedure should be gradual, in order to avoid damage by the abrupt discontinuance of the heat. After working the last charge, the coke is left in the retorts, the furnace fire fully charged, and the passages closed by shutting the dampers and making their closure more complete with ashes from the passages. The inspection plugs on the front of the furnace are further stopped with clay, as also the furnace door, and a small brick wall erected to close the opening of the ashpan. When this has been done, the temperature of the furnace will fall slowly, and without fluctuations of temperature. Before putting a furnace out of action, the carbon should be removed from all the retorts; the ascension pipes cleaned; the tar drained from the hydraulic main, and water run in to take its place; the gas-valve on the outlet of the hydraulic main and that for the tar closed; and the plugs removed from the ascension pipes. These operations are, of course, carried out as soon as the last charge has been completely worked-off.

The furnace having become cold, the retort-plugs are removed and the retorts closed with bricks and clay arranged in the head. Should the level in the hydraulic main be low, the gas (in the frequent event of the valve not closing completely) may return to the retorts and escape by the open ascension pipes. Unless this precaution is taken, an accumulation of gas in the retorts may form an explosive mixture.

(To be continued.)

A COMBINATION COPPER AND COOKER.

When noticing in the "JOURNAL" three weeks ago the display of gas appliances in the London Fair and Market at the Royal Agricultural Hall, mention was made of a combined copper and cooker which was to be seen on the stand of Messrs. E. Harper & Co., Ltd., of Bradford. The serviceable construction of the arrangement will be gathered from the illustration we give to-day.



One claim made for the combination is a saving of space, inasmuch as the complete outfit, which is galvanized, measures only about 36 in. by 20 in., and embodies a 10-gallon wash-boiler and an oven 16 in. by 16 in. by 16 in. The oven door and case are packed; and two boiling-rings are provided. The furnace-pan is of tinned copper, and is heated by a special ring-burner. There is only one gas connection, but four tap-controls on the outfit.

Coking from Sarre Coal.—"Nature" says that the "Comptes Rendus" of the Paris Academy of Sciences for June 20 contained a note by M. Baille-Barrelle on the production of coke from Sarre coal. By the usual method of coking, this coal is well known to give a poor coke; but M. Baille-Barrelle shows that, by a special mode of heating, Sarre coal can be made to yield a coke comparable with the finest cokes from Ruhr coal. The experiments were made on a semi-industrial scale (a charge of 500 kg.); and preliminary work on the extension to a full commercial scale has been commenced. The coal is first maintained at a temperature of 320° C. for some time; and then the temperature is slowly raised uniformly to a final temperature of 750° C., or about 200° C. below the usual coking temperature. It is also claimed that the by-products obtained are superior to those given by the ordinary coke-oven; and an investigation into their nature is in progress. The yield of ammonia was unexpectedly high—about double that obtained when the coal is coked in the ordinary way. It is probable that the actual quantity of ammonia produced was smaller, and that the increased yield was due to the lessened amount decomposed into nitrogen and hydrogen.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents]

"Field's Analysis."

SIR,—The two letters from Mr. H. E. Jones and Dr. Carpenter, respectively, with reference to the above, were read by me with great interest.

The "Analysis" will, of course, in future show all results based on the therm; but I cannot help thinking that some of the working costs—such as, for instance, those comprising the cost of gas into the holder, and possibly distribution—might be usefully worked out also on the basis of 1000 c.ft. Engineers engaged in both the manufacture and distribution of gas have frequently to consider bulk apart from quality; and to many such, the basis of the 1000 c.ft. I am told has a peculiar charm and usefulness of its own. At all events, no harm will be done by giving the two sets of results; and everybody will, I hope, be satisfied.

Dr. Carpenter in his letter mentions the "declared" calorific value. I am still of opinion that the "supplied" calorific value will give the truer, and not only the truer, but the more practical, results.

In conclusion, I greatly appreciate Dr. Carpenter's suggestion, should it be found desirable at any time to make a change in the title of "Field's Analysis."

H. E. IBBS.

Horseferry Road, Westminster, S.W., July 29, 1921.

How it is Done!

SIR,—Hitherto, I have understood that "Engineer" was in practice. From his communication in your last issue, this would appear not to be the case. The man who accepts a statement from any gas engineer (whoever he may be) that 24,000,000 or even 20,000,000 B.Th.U. are produced in gaseous form, in a quality of 400 B.Th.U., from a ton of coal in a water-gas process (to say nothing of 3 p.ct. of inerts) is one with whom discussion from my point of view would be preferably deferred till such time as he has added to his knowledge of the subject.

The make of gas from one ton of fuel in the plant he refers to is, I believe, something like 14,000,000 B.Th.U., and the quality nearer 300 than 400 B.Th.U.

Some people have the question habit very badly. It is not a bad idea for correspondents to ask one question, and get an answer, before asking forty others. Progress is much accelerated on this line.

GEO. HELPS.

Nuneaton, July 29, 1921.

REGISTER OF PATENTS.

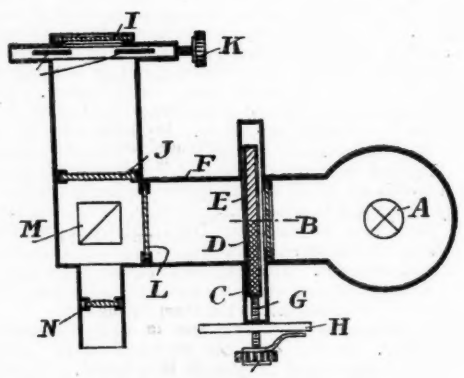
Photometric Apparatus.—No. 147,146.

SIEMENS AND HALSKE AKTIENGESELLSCHAFT, of Berlin.

No. 19,191; July 7, 1920. Convention date, July 8, 1919.

This invention is an addition to patent No. 112,614, which was described as an apparatus for the photometric measurement of light of different colours, in which the comparison light was made up from differently coloured lights by optical synthesis—the components being adjustable. The apparatus is so arranged that filters of different colours are placed in the path of the rays from the comparison light, and, by the changing of these, the colour of the comparison light can be varied by screening off or cutting-out various components until it conforms to the colour of the source of light to be measured. The apparatus used will, with this class of photometer, serve for the measurement of the temperature of incandescent bodies.

In the illustration is shown, in transverse section, a form of the apparatus based upon the arrangement of filters illustrated in fig. 3 of the principal patent.



Siemens and Halske's Photometer.

A is the comparison source of light, enclosed in a casing which is white inside and in the opening of which a ground-glass screen B is inserted. In front of this latter is placed a movable frame C with the two colour filters D and E, of a red and a green-blue colour. The filters may either be placed close together (as shown) or be arranged with a space between them, through which the light from A can pass into the tube F so that greater clearness is obtained. To the knob of

the screw G, which serves to adjust the filters, is attached a pointer working over a scale or dial H, which may be interchangeable to suit for different measurements.

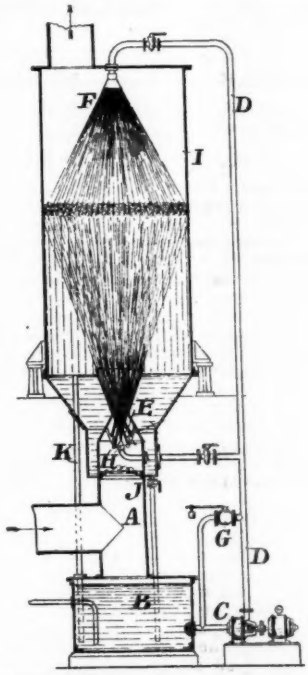
The action of the apparatus is as follows: In order to determine the temperature of an incandescent body placed in front of the ground-glass screen I, the intensity of the illumination of the screen J is adjusted by moving the opaque screens I by means of the screw K. This adjustment is continued until the luminosity of the screen J is approximately equal to that of the screen L, which can be ascertained by the observation of the Lunner-Brodhun prism M through the eye-piece N. When the colour tones have been brought into equality by adjusting the screens or filters, the temperature can be read off at once directly on the scale H, which is graduated to correspond to the nature of the body whose temperature is to be measured.

Washing of Gases.—No. 149,340.

KNÖPFLMACHER, A., and ADLER, R., of Vienna.

No. 21,847; July 21, 1920. Convention date, April 12, 1919.

This invention relates to a process for the separation of matter (by washing) from gases. This is accomplished by a vertical upwardly directed mixing nozzle, which mingles the gas and liquid to form a foam which encounters a washing liquid directed downwardly by a spray-rose, whereby, at the point of impact between the rising spray and the descending drops, the former is broken-up and the combined heavier drops, which have lost direction and speed owing to the impact, fall vertically in the form of rain. The surface-contact between the gas and liquid thus obtained is claimed to be incomparably greater than that obtained by the aid of either stationary or movable solid impact surfaces.



Knopflmacher and Adler's Gas Washer.

In the illustration, the gases enter the admission pipe A which is vertically directed into the bottom of the apparatus. Tar already separated falls down into the collecting tank B, provided with a heating device in cases where the separation of water vapour from ammonia is to be avoided and the specific heat of the gas is not sufficient to keep the temperature above the dew-point of the gases. By the pump C, the tar (heated if necessary) is conveyed through the pipe D to the suction and mixing nozzle E and to the spray-rose F with the required pressure—adjustable by the bye-pass valve G in the delivery pipe of the pump.

The object of the suction and mixing nozzle is, on the one hand, to suck gas from the pipe A, and on the other hand to effect an intimate mixture of the gas with the tar introduced under pressure—a tar-gas foam or spray being formed. The pipe is contracted at its upper end and is then conically flared. In the constricted part a frame is arranged which carries two cones beneath which is the delivery orifice or nozzle H of the supply pipe for the washing liquid. In the mixture and suction nozzle E a foam or lather is formed by the mixture of the sprayed tar with the gas, which mixture is guided into the constricted portion of the pipe A before the latter opens out into the flared cone which delivers into the chamber I.

In order to prevent coarse particles from having access to the suction and mixing nozzle, the gases are caused to pass through a parabolic screen of liquid formed in the upper part of the pipe A by means of nozzles J spaced around the interior of the annular bottom portion of a hopper-shaped bottom of the chamber I. The overflow passing through the pipe K is delivered into the tank B.

Purification or Washing of Gases.—No. 149,341.

KNÖPFLMACHER, A., and ADLER, R., of Vienna.

No. 21,848; July 21, 1920. Convention date, Aug. 8, 1919.

This patent of addition to No. 149,340 provides a development of the process there described which consists in causing the gases to be treated to flow through two or more chambers arranged in series—the temperature in each successive chamber being lower than that in the preceding chamber. Each of the chambers is fitted with a mixing nozzle and rose as described in the principal patent.

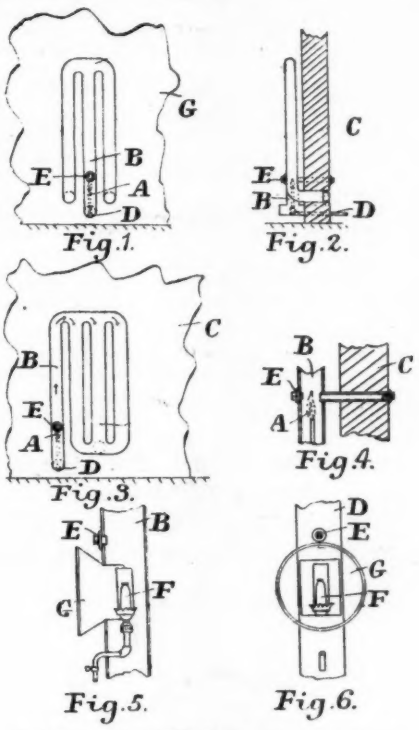
The fall of temperature as between one chamber and the next in succession is obtained by giving a predetermined temperature to the washing liquid supplied to the mixing nozzles and roses—the predetermination taking into account the specific heat of the gases passing through the chambers. By this means fractional separation of the condensates is obtained, as any condensable components having boiling points below the temperature of the washing liquid in any particular chamber will not be separated in that chamber but in the next following one, or in a successive chamber, the temperature in which is lower, due to the temperature predetermined for its washing liquid.

Gas Heating-Stoves.—No. 164,491.

ROBINSON, F. H., and DEIGHTON, W., of Harrogate.

No. 7080; March 9, 1920.

This invention relates to hot-air heating apparatus wherein gas flames are used and in which the air for supporting combustion is admitted from outside the room in which the apparatus is situated, while the spent gases are also discharged outside.



Robinson and Deighton's Gas Heating-Stove.

Fig. 1 is a front elevation of the apparatus mounted within a room that has to be heated thereby. Fig. 2 is a side elevation. Fig. 3 shows a modification of the device. Fig. 4 shows certain devices. Figs. 5 and 6 illustrate the apparatus when using the heating flame for lighting the room in which the apparatus is installed.

The burner A is placed within a tube or hollow shield B that extends vertically, so that (as shown in figs. 1 and 2) the tube extends horizontally in each direction, and downwardly in order to have the outer ends turned to pass through the wall C of the building shown by fig. 2. The burner is supplied with gas through the pipe D; and through the opening in the horizontal end of the tube surrounding the pipe air is admitted to the central tube. A screwed cap E affords access to the flame from the interior of the room.

Instead of having the down tubes on each side of the central tube, the former may be all on one side, as shown in fig. 3.

When making use of the heating apparatus for lighting the room, an incandescent mantle F may be mounted upon the burner, while the lamp G (as shown in figs. 5 and 6) will open into the room.

Charging and Discharging Gas-Retorts. No. 165,111.

CRESSLER, A. D., of Washington, U.S.A.

No. 12,430; July 30, 1918.

This invention relates to apparatus for charging and discharging gas-retorts, slots, and chamber-ovens, in the manufacture of coal gas, coke, and bye-products. The construction of the plant is not described apart from a series of closely-lettered drawings not reproducible within the compass of a "JOURNAL" page.

The claims made for the invention may, however, be given in general terms, as follows.

1. A charging and discharging apparatus for retorts comprising means for simultaneously loading a number of magazines in a vertical

position; means for tilting the magazines thus loaded into the charging position; and means adapted to be aligned with the magazines for simultaneously discharging the material into a corresponding number of retorts, and afterwards discharging the spent material.

2. A longitudinal core carried by each magazine; a combined discharge-pusher and retort-cleaner carried at the forward end of each core; and a charge-pusher carried at the rear end of each core.

3. Means for slidably moving the discharge ends of the magazines into the mouthpieces of a series of retorts; and a reciprocating equalizing and charge regulating core carried by each magazine.

4. A portable carriage adapted to carry a series of tiltable magazines; means carried by the carriage for tilting the magazines into charging position; and a portable carriage adjacent to the magazine carrying carriage, and carrying means for manipulating the magazine cores simultaneously and automatically to charge and discharge the series of retorts.

5. Each equalizing and charge regulating magazine core consists of a longitudinal metallic T-shaped bar carrying a portable retort discharging pusher and cleaner at one end, and a charge pushing device at its other end.

6. A plate extending within and longitudinally of each magazine, and adapted to guide the equalizing and charge regulating core carried within each magazine.

7. A horizontal metallic plate with a central member depending from it, adapted to straddle a guide-plate and having a reduced forward end portion to engage a retort discharging and cleaning device; the core having a closed rear end portion adapted to contact with a charge pushing device, and an outwardly projecting end portion, and means detachably connected to the outwardly projecting end portion so to manipulate the cores as automatically to charge, discharge, and clean the series of retorts.

8. The provision of each portable discharge pusher at one end with a plurality of scraping or cleaning blades.

9. The provision of each reciprocating core within each magazine with a reduced forward end portion and a disc at its rear end provided with a rearwardly extending projection adapted to engage a slot or recess in the rear end wall of the magazine so as to prevent rotary movement of the core bar.

10. The outwardly projecting rear end portion is provided with an annular notch which is engaged by the forward end of suitable core manipulating means.

11. Each charge pusher comprises interconnected perforated discs, suitably spaced apart and slotted horizontally and vertically to allow of the charge pusher as a whole being slid into position on the longitudinal core carried by each magazine.

12. Each portable discharge-pusher (see Claim 2) comprises interconnected metallic discs or plates suitably spaced apart; the rear disc or plate having suitable openings for the escape of gas and a vertical slot to allow of the discharge pusher being slid into position. The pusher is also provided with adjustable scraping or cleaning blades.

Gasification of Fuel.—No. 165,290.

Twynam, T., of Redcar.

No. 12,741; May 7, 1920.

In his specification the patentee says: What has come to be known as the "two-stage method of completely gasifying fuel," lends itself to the utilization of the sensible heat in the gases produced in the second stage for distilling the fuel in the first stage. In order to use this sensible heat to the best advantage, the producer gas has been passed through the fuel in the distillation retort or chamber; but this involves the dilution of the products of distillation with a large volume of gas, and the consequent increase in the difficulty of condensing and otherwise using the products. It has, indeed, been suggested that the hot producer gas should heat externally the distillation retort placed immediately above the producer and discharging the carbonized contents into the latter; also that several small retorts should depend in the producer itself, so as to be heated by the sensible heat in the gases and the radiant heat of the fuel and to discharge their contents on to the fuel bed. The main purpose, however, has been to overcome difficulties which occur in feeding a bituminous fuel directly to a producer, rather than for conducting a two-stage gasification process. The distillation products were generally burnt in the producer.

It is stated to be the object of his invention to conduct the two-stage process under conditions as favourable as possible for the production of light oils and ethylene. For this purpose the fuel which is to be supplied to the producer is distributed among a number of small retorts placed outside the producer, and is passed through these retorts on its way to the producer—being heated during its passage to a comparatively low temperature—generally, not exceeding 600° to 650° C.—by the hot gases which leave the producer and pass around the retorts on their way to the gas-main, ammonia-recovery plant, or the like. By this distribution a much smaller retort can be used than is possible if the whole of the fuel to be consumed in the producer is fed through a single retort.

In the accompanying elevation and vertical section through a producer having small retorts in accordance with the invention, A, B, C are the retorts supported by framework at one side of the producer E. The retorts (in this case intermittently operated) are closed at the bottom by a controlled cone I, so that their contents can be discharged into a shoot F—a downward extension of a casing D surrounding the retorts and opening into the gas exit of the producer.

The coal in the retorts is heated by the producer gas passing around them on its way to the gas-main G. The low-temperature distillation products pass away by the pipe H to be treated in any known manner.

For the proper distribution of the fuel in the producer it is said to be preferable to provide a like number of retorts (in this case three) on each side of the producer; the size of each retort being such that "during the sojourn of the fuel in it this has time to be heated to the required temperature," which "sojourn depends on the frequency with which each retort must be discharged into the producer to ensure continuity of operation of the latter."

Gasification of Fuel.—No. 165,616.

Woodall, Duckham, and Jones (1920), Ltd., and Duckham, Sir A. M'D., of Grosvenor Gardens, S.W.

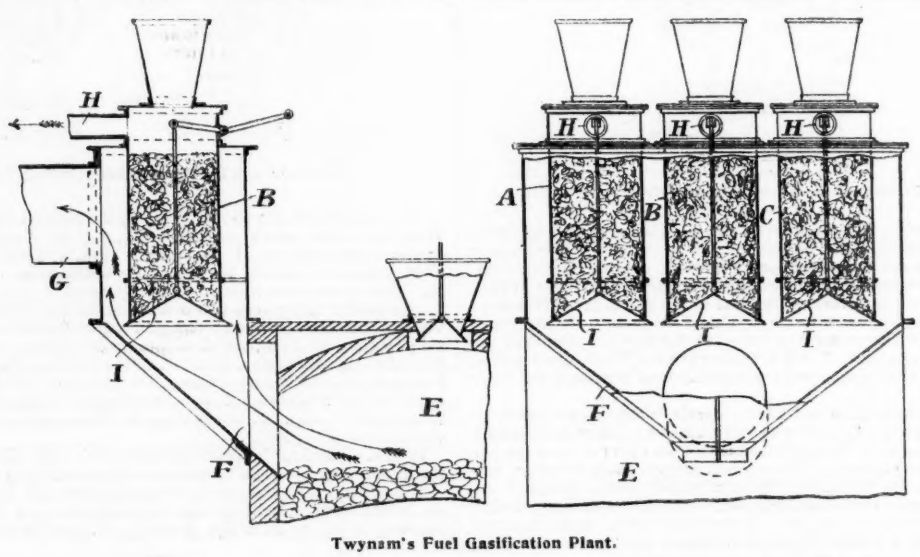
No. 12 937; May 10, 1920.

It has been proposed, say the patentees, in plants for the total gasification of coal and other carboniferous materials to superimpose retorts or carbonizing chambers above water-gas generators—the carbonized material being fed to the generator for gasification therein. In some cases the producer gas made during the "blow" is used for heating externally the retort, and the water gas made during the "run" is passed through the retort.

In plants of this kind (say, that described in patent No. 164 935) clinkering the generator is particularly difficult when the masses of clinker commonly formed in generators have to be removed—chiefly because of the disturbance caused in the uniform passage of the coal through the retort.

By the present invention, the air-blast is admitted to the generator portion of the plant above the material therein and travels downwards through the fuel bed, heating most highly the zone of the already hot carbonized material in which the percentage of ash is least, and there is least liability to form masses of clinker. The steam is then admitted in the reverse direction—cooling the zone in which the ash content is highest, and ascending through the most highly heated zone containing the highest percentage of carbon, which is the best condition for making water gas.

The downward "blow" and upward "run" is not, it is pointed out, in itself new in water-gas generator practice; but, as indicated, it possesses particular advantage in combined retort and generator plant.



Twynam's Fuel Gasification Plant.

Colwall Gas Company.—The annual meeting of the Company was held last week, when a dividend of 2 p.ct., free of income-tax, was sanctioned. The manufacture of gas has now recommenced, under the direction of Mr. J. Cartwright, the new Works Manager.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Swansea Gas Bill and the Colne Corporation Bill: Returned from the Commons, with the amendments agreed to.

The Rhymney and Aber Valleys Gas and Water Bill: Read the third time, and passed, and sent to the Commons. Report from the Joint Committee read, and ordered to "lie on the table."

The St. Helens Corporation Bill: Read the third time, with the amendments; further amendments made; Bill passed, and returned to the Commons.

The Paisley Gas Order Confirmation Bill: Read the third time (according to order), and passed.

The Rotherham Corporation Bill: Reported, with amendments.

The following Bills received the Royal Assent last Thursday; Cardiff Gas, Colne Corporation, Harrogate Gas, Nelson Corporation, Paisley Gas Order Confirmation, Radcliffe and Little Lever Joint Gas Board, Swansea Gas, Tendring Hundred Water and Gas, Waltham and Cheshunt Gas, Wandsworth, Wimbledon, and Epsom Gas.

HOUSE OF COMMONS.

Progress of Bills.

The Colne Corporation Bill: Lords amendments considered and agreed to.

The Rhymney and Aber Valleys Gas and Water Bill: Read the first time, and referred to the Examiners.

The Manchester Corporation (General Powers) Bill: Reported, with amendments, from the Local Legislation Committee.

Copies were presented of drafts of Special Orders proposed to be made by the Board of Trade under section 10 of the Gas Regulation Act, 1920, on applications by the British Gas Light Company (Staffordshire Potteries undertaking), Borough of Glastonbury, County Borough of Stoke-on-Trent.

ROTHERHAM CORPORATION BILL.

This Bill came before the Unopposed Committee of the House of Lords on July 26. The only gas clause in the Bill is the usual one providing for the variation of the price of gas according to the purpose for which it is supplied. [See "JOURNAL" for May 4, p. 274.]

MANCHESTER CORPORATION (GENERAL POWERS) BILL.

This Bill was considered by the Local Legislation Committee of the House of Commons, presided over by Sir WILLIAM MIDDLEBROOK, on Tuesday of last week. The proceedings before the Committee of the House of Lords were reported in the "JOURNAL" for May 4, p. 268. Part III. of the Bill deals with the construction of new gas-works, and with the acquisition by the Manchester Corporation of the undertaking of the Stretford Gas Company.

Mr. TYLDESLEY JONES, K.C. (who appeared with Mr. CLODE, K.C., and Mr. F. T. VILLIERS-BAYLY for the promoters), explained the objects of the Bill, and the position of the Manchester Corporation gas undertaking.

There was no opposition to Part III, though one or two petitions were lodged. There were no appearances, however; all the points in dispute having been settled, or negotiations still proceeding. To meet the opposition raised in the House of Lords, clauses had been inserted providing for equality of prices charged for gas in the Company's area and the Corporation's area; the acquisition of the Company's undertaking from the Corporation by the local authorities in the Company's area, forming a Joint Board, if they wish to do so, and if they promote a Bill for the purpose next session; and for the application of gas revenue, to carry into effect a resolution passed by the City Corporation in October, 1920, that revenue from the Corporation undertakings should not be applied to relief of rates. The last clause provides that from March 31, 1922, the gas revenue shall be applied, first, to the payment of working expenses, and to maintenance, renewals, and repairs; secondly, to payment of interest on borrowed money; thirdly, to sinking fund; fourthly, in repayment to the city fund of any deficiency in the revenue of the Corporation in respect of the undertaking at any time hereafter, made good out of that fund; fifthly, in providing a fund for working capital not exceeding £400,000, the annual sum set aside not to exceed £40,000; and, sixthly, in providing a reserve fund, the annual sum not to exceed ½ p.ct. of the borrowed money outstanding, until the sum amounts to 10 p.ct. of the outstanding money borrowed. The residue is to be carried forward to revenue account for the following year and, as soon as the amount so carried over exceeds the sum required for interest and sinking fund for one year, is to be applied to the reduction of the price of gas.

Mr. TYLDESLEY JONES said the petitions deposited against the Bill in the House of Commons were with regard to subsidiary matters. The Corporation proposed to carry a main over the Bridgewater Canal by means of a bridge to be constructed for the purpose; but the Stretford Urban District Council desired to construct a road bridge over the canal at the same spot. It was therefore proposed that the road bridge should be constructed, which should also carry the gas-main; the gas undertaking to bear part of the cost. Negotiations were now in progress with regard to this. There were other petitions; but they were matters of clauses, and were settled.

Mr. *William Kay* (Lord Mayor of Manchester and Chairman of the Gas Committee) gave evidence in support of the Bill. After dealing with the present position of the gas undertaking, he said that there were 30,000 complaints from consumers last year as to the quality of the gas supplied, which were all due to insufficient pressure, brought about by lack of plant. A very big development was anticipated in connection with the demand for gas. The Housing Committee had decided to equip all the new houses with gas cookers and heaters. Dealing with the water-gas plant, which was now used in order to meet the demand, and which the Corporation would be able to shut-down when the new works were in operation, he said the difference in cost between manufacturing coal gas and water gas represented, on a sale of 1,394,000,000 c.ft., £154,269 per annum in favour of coal gas.

Asked as to the electricity supply in Manchester, witness said that the Corporation owned the undertaking; but it was not so big as the gas-works. For instance, the electricity undertaking supplied about 700 public lamps, and the gas-works some 23,000.

Mr. *William Newbigging* (Consulting Gas Engineer to the Corporation) again dealt with the details of the new works to be constructed. The total cost of these would be £1,640,000; and the capital charges on this sum, at 7·32 p.ct., would amount to £122,796 per annum. Thus, taking into account the economy effected by shutting-down the water-gas plant, a considerable amount would be saved The price to be paid for the Stretford undertaking was £300,000, which in his opinion was reasonable.

Mr. TYLDESLEY JONES then dealt with a report from the Minister of Health, in which it was said that the period of forty years provided in the Bill for the repayment of £1,640,000 for new works was excessive. He quoted five cases in which a similar period had been allowed for the repayment of money borrowed for the construction of gas-works, the most recent of which was that of Chelmsford in 1915. He also pointed out that the Bradford Road works of the Manchester Corporation had been in existence for fifty years, and were still in use. The new works would last even longer than this.

Mr. E. GARDNER (who occupied the chair in the absence of Sir William Middlebrook) said the Committee would grant the period of forty years.

Mr. TYLDESLEY JONES (continuing) dealt with the repayment of the £300,000 for the purchase of the Stretford undertaking. The period in the Bill in the first place was forty years; but they had cut it down by five years. The Minister of Health had submitted in his report that the period was too long; but the report was written when the period in the Bill was forty years. He could not, when asked to do so, point to specific cases in which lower periods had been given, though, no doubt, there were instances; but he referred to occasions on which the period he asked for had been granted.

The Committee granted a period of thirty years.

Mr. TYLDESLEY JONES, dealing with clauses, said that a number of new clauses had been added to the Bill to protect the Cheshire County Council, various local authorities, and the trustees of the will of Sir Humphrey de Trafford, in respect of roads and land. There were also clauses for the protection of railway companies, and the Manchester Ship Canal Company.

Another new clause was inserted to give effect to an arrangement come to between the Manchester and Salford Corporations. Part of the district of Davyhulme was within the statutory limits of the Salford Corporation, and part was within those of the Stretford Company. The clause provided that, from March 25, 1922, the Manchester Corporation should acquire the mains, pipes, apparatus, fittings, &c., of the Salford Corporation in the township of Davyhulme for £7000, and should supply in that area in future.

METROPOLITAN WATER BOARD (VARIOUS POWERS) BILL.

The South Metropolitan Gas Company deposited a petition against this Bill (which provides for the construction of new water-works, &c.), in the House of Lords, with regard to a special clause in the Bill for the protection of gas, water, and electricity mains. The South Metropolitan Gas Company prefer to be protected by the general law, or the Gas-Works Clauses Acts, rather than by the special clause inserted in the Bill by the promoters, though other gas undertakers in the Metropolitan Water Board area are content to be covered by it. The petition was withdrawn, however, before the Bill reached the Committee stage; and a sub-clause has been added to the clause providing that it shall not apply to the South Metropolitan Gas Company.

The clause in the Bill provides for the delivery (21 days before the commencement of any work) to the owners of any mains, pipes, syphons, or other works authorized by Parliament for the supply of gas, electricity, or water, or for sewerage purposes, plans, sections, and descriptions of any works proposed to be carried out in any roads in which such property exists. If it appears to the protected body that such works will endanger or impede their service, they may give notice to the Board to lower or otherwise alter the position of such apparatus or pipes, or to support the same or substitute temporarily such apparatus or pipes, or provide protective works at the expense of the Board and to the satisfaction of the engineer of the protected body. If preferred, by giving 14 days' notice, the protected body may carry out the work themselves, and the cost be defrayed by the Board. Watchmen and inspectors may be provided by the protected body during the progress of the works, and the cost be charged against the Board. If any interruption of service is occasioned, the Board are to forfeit and to pay to the protected body a sum not exceeding £10 a day during which the said interruption continues. The expense of all repairs or renewals of any apparatus or pipes of the protected body which may be rendered necessary through the operations of the Board within twelve months of the completion thereof are to be borne and paid by the Board. In carrying out works the protected body are not to interrupt the user of any works of the Board. Provision is also made for arbitration if any difference arises.

As already stated, the clause is not to apply to the South Metropolitan Gas Company, who prefer the protection of the general law.

MISCELLANEOUS NEWS.

SOUTH SUBURBAN GAS COMPANY'S CO-PARTNERS AT THE CRYSTAL PALACE.

Considerable interest was aroused shortly before five o'clock on Saturday around several of the cafés in the Crystal Palace, by the arrival of a very large "family party," which rapidly sorted itself out in accordance with the colours of the tickets held, so as to conform with the available seating accommodation. As a matter of fact, this party, which was some 2000 strong, consisted of co-partners in the South Suburban Gas Company, together with their wives and friends, from all the stations as far as Dartford, invited by the Directors to take part in a co-partnership festival gathering.

This event had been arranged in combination with the annual South Suburban Gas Company Athletic Sports, which were held in the football ground of the Palace during the afternoon. The programme was a full one (comprising nearly thirty events), and was thoroughly enjoyed by the interested spectators, who included Mr. Charles Hunt (the President) and other Directors. The officers of the Company acted in various official capacities. The final race was a one mile handicap; and immediately after this, a move was made to the Palace, where the guests found an excellent high-tea awaiting them. In the Fountain Café, Mr. Charles Hunt presided, and was supported by Messrs. H. Gundry and W. G. Waller, grace being said by Mr. J. Terrace (the Chief Engineer); while in the Restaurant Mr. B. R. Green was in the chair, supported by Messrs. J. H. Boraston and E. P. Norton, and grace was said by Mr. W. Wastell (Secretary).

Tea over, the party proceeded without delay to the big Concert Hall near by, to take part in the co-partnership meeting, which was presided over by Mr. Charles Hunt, the Chairman of the Company.

Good Wishes from Dr. Carpenter.

The Chairman announced that several letters of apology for absence had been received; the writers including Sir J. Fortescue Flannery, Bart. (the Deputy-Chairman of the Company), Mr. A. Dickson, and Lord Robert Cecil. Proceeding, he said there was another letter to which he would like to call their attention. It was from their friend Dr. Carpenter, the Chairman of the South Metropolitan Gas Company, who wrote on the previous day:

> Dear Mr. Chairman,—It is with very sincere regret that I find it impossible to be present at the co-partnership festival of the South Suburban Gas Company to-morrow. The original difficulty of being out of town I think I might have overcome; but my attendance at Old Kent Road in the afternoon is absolutely necessary, in order to arrange the allotment of our recent issue of stock.
>
> I am more than ever convinced that the principles of co-partnership provide the only true solution of our present industrial troubles, and that their more universal adoption would be an effective check to the pernicious and reactionary doctrines so widely preached to-day. The possibilities of co-partnership have been recognized in the coal industry; and it is to be hoped that an effort will be made to apply its principles to the railways.
>
> The experience of the South Suburban Gas Company and its employees for the last 27 years has admirably demonstrated the value of co-partnership; and the festival is a happy reminder of that mutual goodwill and harmony which have for so long existed between them.
>
> Charles Carpenter.

Mr. Charles Hunt on Present Conditions.

The Chairman (proceeding) said he was sure they would all agree with him that this was a very kind and graceful meeting, and that they would wish him to convey to Dr. Carpenter their regrets that he was unable to be present, and their thanks for the message which he had sent them. Really, it might be stated that the difficulty which had prevented Dr. Carpenter coming was almost one of having too much money. As no doubt many of them were aware, the South Metropolitan Gas Company invited applications for an issue of stock on the morning of Wednesday last; and by noon the list was closed, the whole of the £734,000 asked for having been subscribed. It seemed to him that they might accept this as a good omen for the gas industry generally. For some time past it had been a very difficult matter for gas companies to raise the capital which they required adequately to operate their works. The South Metropolitan was the most successful issue that had yet been made under the new conditions; and they must offer their congratulations to Dr. Carpenter and to the Company upon the great success that had been achieved. Turning to their own affairs, it was a very great pleasure to him on this occasion to meet them in a room which was large enough to hold the whole of the Company's co-partners. The matter appeared to be one of considerable difficulty. A year ago, when he met the co-partners in the Livesey Hall, on the occasion of Lord Robert Cecil's attendance, he remembered wondering whether it would be his good fortune ever to see so large a meeting again. Shortly after that gathering, it became necessary to consider the arrangements for another year, and the subject was referred to a Sub-Committee of the Board consisting of Messrs. H. Gundry, B. R. Green, and J. H. Boraston, with the two Employee Directors, Messrs. W. G. Waller and E. P. Norton. These gentlemen were to be congratulated upon the result of their efforts. The twelve months which had just ended had been a very eventful period. To name only two matters, there were the great coal stoppage which lasted three months on end, and the effect of the Gas Regulation Act upon their own Company. All he need say with regard to the coal stoppage was that it tried them very severely. They had not at the commencement of the trouble a sufficiency of stock to outlast three months, so that towards the end it had been necessary to resort to foreign coal. He was, however, glad to say that from first to last there was no diminution of the supply, and they maintained the calorific value which they had declared. This reflected great credit upon Mr. J. Terrace (their Chief Engineer), and all who were connected with him in the work. He did not mean to tell them that, with regard to money, the coal strike had not punished them, for it had; but happily, notwithstanding the loss that had been incurred, the Board had been able to decide upon paying the maximum dividend to which the shareholders were entitled under the Gas Regulation Act—that was, £5 6s. 8d. p.ct., compared with the £3 15s. p.ct. which a liberal Legislature had allowed them to divide during the war. This increase of dividend brought to mind another thing connected with it—namely, the bonus of the co-partners. This had been maintained throughout the war, and the period succeeding the war, at a minimum figure; but the Board intended now to increase it, in accordance with a scheme which he briefly explained. It would be a very substantial addition to the present amount; and he hoped the co-partners would feel that the Board were doing all they could for them. [Applause.] It must be remembered that the standard price had been reduced from the 17d. per therm for which the Company asked to 15d.; and so they had to "cut their coat according to their cloth." Now they were under the Gas Regulation Act, and were enabled to pay higher dividends if they could earn them, the earning of them would entirely depend upon the conditions of the industry. If these conditions did not improve, the earnings could not be increased. He referred particularly to the coal position. They were paying now far more for coal than they were paying before the war; and to his astonishment, the first message that greeted them after the miners went back to work was from the Midland coalowners, to the effect that they would have to pay 3s. per ton more for their coal. His reply was that they would not get a penny more from the Company than they paid before the strike. He believed that the proposal had now been largely withdrawn, but he was sorry to hear that many Midland undertakings had agreed to the amount to be paid over a certain term. In conclusion, he felt he could not speak too highly of the value and importance of what had been accomplished by the Works Committee during the past year. He did not know how the works could now be carried on without the Committee. Ever since it was started two years ago, there had been unanimity, and, as far as he knew, perfect good feeling between employers and employed.

A Summary of Co-Partnership Accounts.

Mr. John Baker (Co Partnership Secretary), called upon by the Chairman to report upon the fund, then proceeded to give a summary of the co-partnership accounts from 1894 to 1920. He explained that, owing to the date for the co-partnership bonus having been altered from June to December, he was unable to give them the figures for the year 1920-21. The summary he was about to give them, however, would doubtless prove of interest, as he believed the figures had never been published before. From 1894 to June 30, 1920, the bonus had amounted to £69,686; savings, to £73,453; and interest, to £4864. This, with an item of £1015, for balances on the Dartford pass-books, made a total of £149,020. On the other side, the figures were: Withdrawals, £59,389; withdrawals to purchase stock, £71,823; withdrawals on leaving Company's service or through death, £2852; balance, £14,975. The first item on this side—£59,389 for withdrawals—might seem large; but it included amounts withdrawn to purchase the Company's stock privately, and for part-purchase of houses, &c. Six months' bonus for the period June to December, 1920, had been credited in the co-partnership pass-books, amounting to £1112; the number of co-partners being 1322. A total of £57,438 of 5 p.ct. ordinary stock of the Company was now held by 783 co-partners. In regard to the Sickness Approved Society, the first Government valuation as at Dec. 31, 1918, had been received, and showed a very satisfactory surplus of £1866. Of this sum, £1215 was available for additional benefits for the next five years. It had therefore been agreed to pay the following additional benefits to all members who were on the books of the Society on July 5, 1920, and who had been continuously insured since Jan. 1, 1919: Increase of sickness benefit by 4s. per week; increase of disablement benefit by 2s. per week; additional maternity benefit of 8s. In cases where a member retired under the superannuation fund rules, he was entitled to one year's free benefits. He would then cease to be a member of the Society, unless he became a voluntary contributor, and paid double contributions. It was thought that in a good many cases this would come rather hard upon the employee, so it had been decided to set aside £243 of the available surplus to pay for such contributions. As to the accident fund, it was gratifying to note that over the last eighteen months there had been a very satisfactory decrease in the number of accidents. For the six half years ended July, 1919, they averaged 50 per 1000 employees per annum; whereas for the last three half years there had been a decrease to 37 per 1000 employees per annum. The matter of relatives visiting graves in France was referred to the War Fund Committee; and the necessary arrangements for the journey were made through the Y.M.C.A. Several relatives had been over, and had since written expressing their thanks to the Company for their kindness in enabling them to visit the graves. All were greatly satisfied with the way the Y.M.C.A. looked after their comfort. In conclusion, he felt sure those present would agree that the various funds were in a very good condition.

The Works Committee.

Mr. C. J. Carter (Secretary of the Works Committee) remarked that towards the end of 1918 the co-partnership rules were amended in certain particulars—the chief of which were the institution of a Works Committee and of an annual meeting. It was quite beyond his anticipations, and the anticipations of most of them, that after the short space of two-and-a-half years the annual meeting then in mind would have reached the dimensions of the great gathering that day. Last year advantage was taken of the unveiling of the war memorial for the purpose of getting together as many as possible of the employees at all the stations; but this year, they had gone a great deal further. The object of this annual meeting, beyond the social value of the gathering, was to keep the co-partners informed of the developments and of the activities of the co-partnership. They had already been informed upon various matters; and now it was his duty to tell them of the progress of the Works Committee during the past year. The

members of the Committee did not confine their attention solely to the interests of the section of workers whom they happened to represent, but tried their utmost to acquaint themselves with the conditions governing the work of all other classes of employees, so as to enable them to arrive at a fair decision upon any matters that might come before the Committee. He had noticed a considerable increase in feelings of comradeship among the men, which was all to the good, and should be one of the results of the co-partnership system. Not only had the Committee to endeavour to equip themselves with knowledge of the conditions of their fellow workers, but as shareholders in the Company they had to consider the Company's point of view in all matters that came before them. During the past year the Committee had had eighteen meetings, and no less than 54 items of business had been discussed. The first of these was the threatened national stoppage in the gas industry. A comparison was made between the conditions existing in their own Company and the national demands that were then being formulated; and it was found that in their Company they were already in actual enjoyment—and in certain respects had been for many years—of some of the things it was desired to enforce as general conditions of the industry to-day. Having referred to other matters that had been discussed, he pointed out that the Committee were asking now for a renewal of the confidence of the co-partners.

The report of the Works Committee was adopted.

SOME VIEWS ON CO-PARTNERSHIP.

The CHAIRMAN at this stage remarked that there were several Directors of the Company present, and among them were those who had taken part in the arrangements for the day. They would like to hear a few words from them.

Mr. H. GUNDRY said he thought everybody who had co-partnership at heart must be proud to look upon such a magnificent meeting as this, which had come about at a most opportune moment. They knew that the country—in fact, the whole world—had been going through a period of industrial unrest such as had not been heard of before, until at last people had come to ask, "Is there no remedy?" Well, those present knew there was a remedy. They had a remedy, and it was co-partnership. They knew that co-partnership was not merely a theoretical remedy, but was a remedy which had been well tried in practice. They had tried it on themselves with extraordinary success. Why was it such a success? Because they were all pulling together. They were all of one mind, and had mutual trust. They knew that one co-partner did not want to outwit another. So long as they went on thus, they would be safe.

The CHAIRMAN said they would all remember Sir John Boraston, and were delighted to have his son to follow him.

Mr. J. H. BORASTON told his audience that this was the first annual co-partnership meeting that he had attended, and he was grateful to the Chairman for giving him the opportunity of saying a few words. He was one of the latest recruits to the Company; but for all that he had taken an interest in the undertaking and in co-partnership for a number of years. What he heard at the first meeting of the Committee that he had attended would make a very lasting impression on his mind, greatly exceeding anything he had expected. As he realized the way in which difficulties had been smoothed-over and disputes had been settled amicably, and how even-handed justice had been done, he felt that here in this co-partnership Company they had got something which was very different indeed from an undertaking which was run by one man or by one body of men. They had a Company in which every man, from the Chairman to the latest joined, was doing his best to make the business a success. In fact, the Company was running itself. This seemed to be an ideal which all undertakings should strive after. He was very proud to be associated with an undertaking which was being operated upon co-partnership lines.

Mr. W. G. WALLER remarked that, as the senior representative of the employees on the Board, it was his pleasure to thank the Directors very heartily for having invited them all there that afternoon, and for their hospitality. It would cement the goodwill between employer and employed. Speaking personally, the longer he was connected with co-partnership, the more he admired it. It was a policy of give and take. The essence of co-partnership was fairness. Had co-partnership been operative in the coalfields, they would not have had the recent miserable strike. He hoped that co-partnership would spread out over the length and breadth of the land. Then they would have industrial peace, but not before.

The CHAIRMAN said they were privileged to have with them a veteran co-partner, Mr. Greening; and he would ask him to address the meeting.

Mr. E. O. GREENING, after informing his hearers that he was now 85 years of age, proceeded to deliver a spirited address upon co-partnership principles, in the course of which he gave an interesting account of what has been accomplished in connection with the well-known example at Guise. He declared that, though the co-partners listening to him had done great things, and everyone admired them for it, they had not by any means exhausted all that was possible for employees to achieve, working in unity with their employers and with the public. They had only to go on pulling together, and they would bring to themselves blessings beyond anything that could at present be conceived.

Mr. E. W. MUNDY (the Secretary of the Labour Co-Partnership Association) reminded co-partners that, through his organization, what they did got known throughout the whole world. They all looked forward to the spread of co-partnership throughout the industries of the country.

On the proposition of Mr. S. B. CHANDLER, the Chairman was accorded a hearty vote of thanks for presiding; and Mr. HUNT, in response, expressed the hope that the gathering might be the precursor of many more such meetings.

The prizes that had been won during the afternoon were then distributed (including the handsome silver challenge cup presented by Mr. Hunt) by Miss Hunt, who was cordially thanked for so doing, at the call of Mr. H. M. ELLIS, Hon. Secretary to the sports.

GAS REGULATION ACT SPECIAL ORDERS.

Borough of Glastonbury.

A Special Order under section 10 of the Gas Regulation Act as proposed to be made by the Board of Trade gives the Corporation power to construct gas-works, &c., on lands described in the schedule. The Corporation may also acquire, in addition to the land scheduled, any lands not exceeding in the whole 7 acres which they may require for the purposes of their undertaking (but not for manufacturing gas or residual products); and they may purchase residuals from other gas undertakers up to the now common one-third of their own quantity.

Borough of Stoke-on-Trent.

A Special Order empowers the Corporation to borrow, with the sanction of the Ministry of Health, such sums as may from time to time be required for the purposes of the gas undertaking.

DECLARATIONS OF CALORIFIC POWER.

Tendring Hundred Water-Works Company.—470 B.Th.U. (Aug. 1.)
Waltham and Cheshunt Gas Company.—450 B.Th.U. (Aug. 1.)

BRITISH ENGINEERING STANDARDS ASSOCIATION.

Annual General Meeting.

The British Engineering Standards Association held their third annual meeting on the 14th ult., at the Institution of Civil Engineers, when Sir ARCHIBALD DENNY, Bart. (the Chairman), presented his report, and made a review of the position. The meeting was well attended (some eighty members being present); and a number of useful suggestions were made.

The Chairman's address once again showed the vastness of the work undertaken by the Association, and the economical manner in which it is carried out. There are now more than 1500 engineers who give their time and experience to this national work, often at great personal expense and inconvenience. It is, however, pointed out that, whereas engineers generally take the keenest interest in the various problems submitted to the Association, the business community is not as impressed as it should be with the commercial value of standardization; otherwise the Association would not have so much difficulty each year in raising the comparatively small sum required for this work, which is of such value to the trade and commerce of the country. Last year £15,000 alone was expended, of which the industry of the country contributed about £10,000—the remainder being in the nature of grants from His Majesty's Treasury and the Indian and Dominion Governments. If there were only a stronger link between the engineering and the selling side of industry, those who hold the purse-strings would realize to a greater extent their privileges as well as their obligations, and so enable the Association adequately to cope with the increasing demands being made upon its organization. The Chairman mentioned that chemists and chemical engineers are now making use of the organization, and that their work is bound to have a beneficial effect on this branch of British trade. He also referred to the satisfactory working agreement that has been arrived at with the various Research Associations. In glancing at the work abroad, he stated that there are now eleven Local Committees actually at work. These Committees are continually making valuable suggestions to the Home Committee. He also mentioned the question of International Standardization and the proposals which are to be put into effect in order, with proper safeguards, to assist in guiding along right lines the trend of international agreement in engineering matters generally.

There is undoubtedly a growing appreciation, both by the Government and by industry, of the value to the trade of the country of this independent and absolutely neutral organization. With the continued and loyal co-operation of the engineers of the country, which the Association so abundantly possesses, and with the moral and financial support of the Government and industry at large, the Association may look forward to much increased usefulness in the future.

Extraordinary Charge at Aldershot.—At Aldershot last Thursday, James Heath was committed for trial on a charge of endeavouring to persuade a fellow employee to put grit in the bearing of a water-gas plant, in order to reduce the output of a man who was making more gas than defendant. It was stated that if this had been done, the plant might have been blown-up.

Honorarium at Mansfield.—Details as to how supplies of fuel were obtained during the coal strike were furnished to a special meeting of the Town Council last week. The Gas Committee expressed their appreciation of the services rendered by the officials of the Corporation, and decided to pay Mr. James Gibson (the Gas Manager) an honorarium of £25. The Mayor said they were very glad to have got through in the smooth way they did; and Alderman Wilson congratulated Mr. Gibson on the capable way he had managed matters.

Montrose Gas Company, Ltd.—The report of the Company for the year ended June 30 states that the quantity of gas consumed amounted to 52,009,200 c.ft., being an increase of 7,936,900 c.ft. on the previous year. The accounts show a profit for the year, after deducting the usual allowances for depreciation, interest on debentures, &c., of £1870, which added to the sum of £2173 brought forward, gives a total of £4044. In view of the uncertainty of the times, and the writing-down next year of the present entered value of the system which is being superseded by the vertical retorts under construction, the Directors propose to carry to reserve fund £2300, and to defray the cost of the reconstruction of the Company, amounting to £548—leaving available for distribution £1195. They recommend payment of a dividend of 6 p.ct., less income-tax, which will require £945, leaving to be carried forward, subject to Directors' remuneration, a balance of £250.

POSITION OF THE LANCASTER GAS UNDERTAKING.

The minutes of the Gas Committee submitted at the meeting of the Lancaster Town Council last Wednesday mentioned that a communication had been received from Mr. Chas. Armitage (former Gas Engineer), arising out of the recent report of the Engineer (Mr. G. Dixon) as to the condition of the gas-works, and certain comments in a Lancaster contemporary, alleging that the condition of the works had been misrepresented. He said the comments were derogatory to the work carried out by himself and his son. When in the position of Engineer and Manager Mr. Dixon had previously criticized the newspaper in question for its "foolish comments," based on lack of technical knowledge; and the Committee had resolved: "That Mr. C. Armitage be assured that the Gas Engineer's report to the Council contained nothing in any way derogative to the past management of the gas-works; (2) that the Committee accept and support the Engineer's report as a correct statement of the position of the undertaking; and (3) that strong steps be taken to call the attention of a section of the local press to the unfairness and harm done by consistently publishing observations and comments based on technical facts, without first getting in touch with the department concerned to verify statements."

The net extra cost of the coal strike was £4464; and the Committee recommended an increase from Oct. 1 in the price of gas of 6d. per 1000 c.ft., from 3s. 3d. to 3s. 9d., with corresponding increases in the amount charged for slot-meters and public lamps.

Mr. TILL (the Chairman of the Gas Committee) quoted at length from Mr. Armitage's letter, in which he said the allegations discredited the past services of himself and son, extending over a period of 38 years. Mr. Till said there was a difference of opinion as to the cost of the new work outlined, which was attributable to Mr. Armitage being out of touch with present-day prices. The letter concluded with an offer that the Engineer's report be submitted to a competent firm of consulting engineers; and if any neglect could be proved in carrying out his duties in the past, he would undertake to defray the cost of the report. Mr. Till said that when the comments protested against appeared in a local paper, Mr. Dixon himself complained in language which the Editor described as "arrogant and censorious." The outcome of the matter was the passing of the threefold resolution. While they held the Engineer's report as justified, they denied that there was anything derogatory to the late managers, for whom they had the greatest respect, and to whom he had frequently referred in complimentary terms. Lancaster occupied a very favourable position in regard to the supply of gas, which was almost cheaper than any other part of the country. As to the proposed increase in the price of gas, he pointed out that the coal strike cost them an extra £4464, despite a gain of £500 on coke. They were previously faced with a deficiency of £10,000, being asked to find £2000 for the relief of the rates. They anticipated they would make up £6000 by the end of the year; and the proposed increase would recoup them to the extent of £5000.

Alderman BOWNESS supported the appeal of Mr. Armitage for an inquiry; and suggestions were made that Mr. Armitage's letter should be published in the press.

The minutes were passed.

MARGATE'S EXPERIENCES DURING THE STRIKE.

Mr. J. M. Campbell, the Engineer and General Manager of the Isle of Thanet Gas Company, in the course of a letter received last week, wrote: At the time when the stoppage began, our stocks of coal were sufficient to last under normal conditions for a period of two months, which we considered at that time would be ample to cover the likely period of the dispute. We have no carburetted water-gas plant at these works; but, having a system of continuous verticals in operation, it was decided that as great a use as possible should be made of the process, in order to eke-out our stocks for an even longer period. As will be generally recognized, Margate has a considerably increased population during the summer months to that in the winter; and this year has been no exception to the rule, with the result that greater quantities of gas had to be sent out to cope with the demand during the period of the stoppage.

Fortunately, the coals in stock which were utilized during the early weeks of the dispute were of good quality, and the coke was excellent, thus maintaining the heats so well as to permit of steaming to a larger extent than previously, and without material diminution in the quality of the gas sent out. Later, however, coal of a deteriorated quality had to be employed, and the temperatures became lower owing to the poor quality of the coke. Steaming had to be reduced as a consequence, resulting in additional retorts having to be put into operation, with an increased quantity of coal carbonized and additional labour for the purpose.

The Company were later obliged to obtain supplies of imported coals, and had in all 4828 tons—consisting of "Reparation" coal, French unscreened, French screened, Belgian unscreened, Saar Valley nuts, Saar Valley unscreened, and American coals from Nos. 5 and 7 Pools. Our experience of these coals was that the Belgian unscreened was by far the worst received; "Reparation" coal being next. The American coal and Saar Valley nuts were very good indeed from a gas-making point of view; but coke from the latter was rather small. The Saar Valley unscreened coal was in our case inconsistent in quality, and the later supplies almost as bad as that which was delivered under the heading of Belgian unscreened. The French screened coal was good, and was almost equal to our second-grade Yorkshire coal, with good quality and quantity of coke produced. The prices that had to be paid for these varied from 69s. 6d. per ton f.a.s. our harbour for the American coals (which gave such satisfactory results), to 105s. per ton f.o.r. Margate Station for the Saar Valley nuts; and on a general computation of the financial results, judging from the poor makes obtained from certain of these, it is estimated that our loss amounted over the whole period of the stoppage to an average of 3s. 3d. per 1000 c.ft. of gas manufactured.

My Directors decided at the outset that at all costs the maintenance of the supply within the district had to be upheld, as it was realized that, in a seaside resort of this character, the needs of the visitors had to be carefully studied, and no system of rationing could be introduced, as gas is required in the various hotels, boarding houses, &c., at all times of the day, and is also essential during the night in nursing homes and institutions of a similar character. Pressure was also maintained as usual over the period.

The net result, therefore, was that the public supply was continuous during the whole of the stoppage, with the sole exception of a portion of one day, when Belgian unscreened coal produced such a low yield of gas, and the demand was so exceptionally heavy, that pressures had to be reduced for about eight hours to a minimum of 2 in. at the works, so as to prevent the gasholders grounding. The quality was equally maintained, and was an average of round about 450 B.Th.U. throughout, though at times very considerable difficulty was experienced in securing this quality, because of the character of the coals and the coke produced. By reason of the excellent service rendered, an increase in the quantity of gas supplied had been recorded, though this was somewhat minimized by the public lighting, which was reduced very considerably indeed both as to the number of lamps alight and the hours over which they were in operation. The generality of the consumers have expressed themselves in terms of appreciation of the way in which they were served over the thirteen weeks' stoppage; and on the whole, I think, the Company has passed through the ordeal very satisfactorily

WHITBY GAS COMPANY AND THE STRIKE.

The Company, writes Mr. Wm. M. Galleway, Secretary and Manager, were well supplied with coal at the commencement of the stoppage, and were able to maintain an unrestricted supply of gas during the whole period, notwithstanding an increase in the output ranging up to 120 p.ct. A Tully gas plant was installed a few months ago; and the percentage of the water gas, slightly enriched with creosote oil or tar, was increased to 75 p.ct. They purchased a small quantity of American coal and a quantity of coke to supplement their own production for the water-gas plant. The stock of coal in the town was exhausted the first week; but they were able to purchase and distribute some hundreds of tons of furnace coke, which enabled the bakers and confectioners to carry on.

STRIKE EXPERIENCES OF WORKS TAKING COKE-OVEN GAS.

[By JOHN W. BREARLEY, Engineer and Manager to the Swinton and Mexborough Gas Board.]

At the beginning of the coal strike we had sufficient coal in stock at Swinton to last six weeks. The only stand-by carbonizing plant we have, to the coke-oven gas supply, is our old horizontal bench (hand-charged), which had been entirely shut-down since October last year. We hesitated to light up this until the last moment, as it was hoped that a settlement would be arrived at. Also we were given the impression two days before the strike took place that the coke-oven men would be allowed to continue at work. On Friday, April 1, therefore, when the gas supply from the coke-ovens was shut-off at 7 p.m., we were not making sufficient gas with our own plant to turn the meter-drum. The pressure of gas to the district had to be reduced considerably; and it was not until Sunday, April 3, that gas-making operations were in full swing. Fortunately we just managed to get through without shutting-off the gas supply entirely. During the strike we were able to obtain supplies of slack from a local colliery by means of motor wagons, and were in a position to give a full supply of gas throughout the strike period.

Supplies of coke-oven gas have not yet been resumed, as the colliery people are carrying out extensive repairs to their ovens. This has placed us in a further difficulty, as we are unable to obtain the coal supplies we desire, owing to the fact that we have no contracts—all replies to our inquiries being the same, that their production is fully sold. We are having to be content with slacks, or anything else we can secure.

As we have had nearly two years' experience with a coke-oven gas supply, perhaps a few general remarks on this will not be out of place. We commenced taking coke-oven gas on Oct. 1, 1919, from a local colliery, shutting-down entirely our carbonizing plant. Supplies of gas of good quality were obtainable fairly regularly until Oct. 16, 1920, when the Yorkshire coal strike commenced. Our own carbonizing plant had been got ready, and supplies to the district were continued without reduction or interruption. Supplies of gas from the colliery were resumed within two days of the strike ending.

Though our experience with a coke-oven gas supply has, on the whole, been fairly satisfactory, there are certain disadvantages. Owing to the uncertainty of continuity of supply, due to disputes, breakdowns, poor coke market, and other causes, it is essential to have stand-by carbonizing plant of sufficient capacity to manufacture the maximum load. In order to be equipped for sudden stoppages, it is also necessary to provide some form of carburetted water-gas or complete gasification plant. This means capital expenditure for plant which may or may not be utilized. In these times of expensive "borrowing," I am sure it would be a difficult matter to get directors or gas committees to agree to the installation of plant which may be used perhaps two or three times a year. This aspect of the matter is certainly one to take into account when considering a coke-oven gas supply.

When coke-ovens are working at full capacity, and there is a big surplus of gas available, the quantity and quality obtainable is all that can be desired. During the period January to April this year, when the colliery had to shut-down about 50 p.ct. of their ovens, owing to the poor coke market, we had difficulty in getting all the gas we required. Also the quality deteriorated greatly. We have no remedy

against this, as the Agreement with the Colliery Company reads as follows:

> "The Board shall take such quantity of coke-oven gas produced by the Company as the Board shall from time to time require . . . but not exceeding 700,000 c.ft. per day; and such maximum quantity shall be subject to a reduction in the event of accidents to the Company's plant, strikes, lock-outs of workmen, extensive repairs to coke-ovens, breakdowns, or other unforeseen circumstances beyond control."

Apparently the colliery people consider a "poor coke market" an "unforeseen circumstance," as this has certainly interfered with the supply of gas. I fail to see how coke-oven gas suppliers are able to enter into an agreement that will be entirely satisfactory to a gas undertaking, as they are only able to guarantee supplies when they have the gas available. I can see that, when operating under the Gas Regulation Act, this is going to be a further disadvantage. I have no doubt that, if the coke-oven gas suppliers could be prevailed upon to take greater responsibility with regard to continuity of supply, there would be a great demand for coke-oven gas, where available. At present, however, the only real advantage is the low price at which it can be obtained compared with the high manufacturing costs of coal gas.

SMETHWICK GAS-WORKS RE-ORGANIZATION.

The annual report of the gas undertaking, which was submitted to the Smethwick Town Council last week, showed that the outstanding loan debt had been reduced, and the net indebtedness on the undertaking amounted to £95,989—a reduction during the year of £6128. The average cost of the coal carbonized was 44s. 2d. per ton, being 10s. 10d. per ton in excess of the previous year. The total amount paid in wages was £57,046, an increase of £11,174; and the net deficiency for the year was £819. The accounts were approved.

In connection with the re-organization of the vertical retorts and the coal and coke handling plants, the Council accepted the following tenders: Messrs. Thomas Vale and Sons, Ltd., for alterations to the gravity bucket conveyor, and provision of skipways, &c., under retort-settings, £2557; and for four telpher skips, £456. Messrs. Arthur Duckham & Co., Ltd., for the supply and erection of a waste-heat boiler, complete with fan, turbine, &c., £4276. Messrs. R. Dempster & Sons, Ltd., for a telpher conveyor, £8475.

LOUGHBOROUGH GAS REPORT.

The adoption of the annual report of the Gas Committee was moved, at the last meeting of the Loughborough Town Council, in the absence of the Mayor, by Mr. White, who explained that the net profit for the twelve months amounted to £1111. Taking everything into consideration, he thought this was very satisfactory. The revenue account was £3964 more than last year; but they had first of all to clear-away a deficiency of £1237 on the previous year's account, leaving them with the amount stated. There had been increases in all directions. The quantity of gas manufactured had gone up 1·99 p.ct., and that sold 2·22 p.ct. The blue water gas made was more by 3·48 p.ct., and the gas consumed through slot-meters had increased by 3·48 p.ct. The average amount taken from the slot-meters had increased from £4 3s. 2d. per year to £12 4s. 4d.; and the total amount received from this source from £15,863 to £20,152. He was afraid that the price of gas would have to be increased if the undertaking was to pay its way, as more would have to be given for coal. The price of gas had only been raised 65 p.ct. above pre-war figures; but the extra charges involved were very much more.

At the same meeting, a report of the Water-Gas Plant Sub-Committee was adopted, recommending—subject to the sanction of the Ministry of Health being obtained to raising the necessary loan—that the tender of Messrs. W. C. Holmes & Co. should be accepted for the supply and erection of water-gas plant extensions. Messrs. Holmes's was the lowest tender—amounting to £3950. With respect to the buildings required for the extensions (the architectural work of which will be carried out by the Borough Surveyor), the Clerk was instructed to communicate with Messrs. Holmes inquiring whether they had plans and specifications of the buildings which they would be prepared to submit without any additional cost; and the Gas Manager was authorized to obtain tenders for the work.

Agreed reductions in the wages of Wallasey gas workers, carters, and motor-men amount to £2500 for the year to March 31, equal to about 1d. in the pound on the rates.

At the annual meeting of the Bradford Coal Merchants' and Consumers' Association, Ltd., the Chairman (Mr. Joshua Smith) gave an account of the coal situation and its vicissitudes during the past year, and took the opportunity to express the appreciation of the coal trade of the manner in which the Bradford Gas Engineer (Mr. Charles Wood) had assisted in the distribution of coal during the crisis. Not only did Mr. Wood carry out with great fairness and ability his duties as Executive Officer, but as head of the gas undertaking he was able to place at the disposal of the trade large quantities of coal suitable for domestic and commercial purposes.

A Company, entitled "Cie. Continentale des Foyers Turbine," of No. 29, Rue de l'Evèque, Brussels, has been formed, with a capital of 1,000,000 frs., to exploit the "Turbine" furnaces, of which the original was invented some four or five years ago by Mr. V. R. Chadwick, who is now the Technical Director to the Turbine Furnace Company, Ltd., of 238B, Gray's Inn Road, W.C. Mr. W. H. Badams, the Managing-Director of the English Company, has a seat on the Board of the Continental Company, as representing the English interests. The Managing-Director of the Continental Company is Lieut.-Col. B. A. Thornton. The field before the new Company is practically unlimited, inasmuch as it has been formed to work the whole of the continent of Europe and such colonies as belong to the continental countries.

TRADE NOTES.

[For "Journal" Advertisers.]

Stanton-Hume Reinforced Concrete Pipes.

In the form of some brief statements of facts, accompanied by appropriate sketches, the Stanton Iron-Works Company, Ltd., near Nottingham, in a newly-issued pamphlet, explain the centrifugal process of manufacture of Stanton-Hume reinforced concrete pipes, and furnish information as to weights and the method of jointing. It is claimed that, owing to the centrifugal action of the moulding machinery, a pipe is produced the density of the concrete of which is considerably greater than any other make of reinforced concrete. The revolving moulds are fed with concrete mixture, which automatically spreads itself evenly over the inner surface. The centrifugal action expels all the excess air and water, resulting in an absence of voids. The reinforcement consists of a cylindrically and spirally wound wire cage of suitable tensile strength; and it is placed in the mould, and held in a central position by the centrifugal action. Tests have proved that this pipe will withstand considerably more external load than stoneware pipes; and it is so constructed that it is impermeable to a moderate excess of the actual working pressure for which it is designed. Should the pressure be materially increased, the pipe will expand, and allow the excess to percolate through the structure. Upon resumption to normal pressure, the pipe will "take up," and become as impermeable as before. The pipe can be made exactly to meet requirements in the matter of external and internal pressure. Owing to the abnormally smooth internal surface of the pipe, frictional losses are reduced to a minimum.

Reinforced Concrete Construction.

Messrs. Peter Lind & Co., of No. 2, Central Buildings, Westminster, have based their organization upon the conviction that, of all constructional materials, reinforced concrete requires the closest co-operation between those who design and those who carry it out; and that therefore, when the work is designed by one firm and carried out by another, complications and delays are bound to occur. This being so, in order to be able to offer satisfactory service, they decided from the outset to act both as designers and contractors, and have built up a complete organization capable of seeing every contract through from the preliminary design to the completed structure. The designing staff are thus not only fully conversant with the latest scientific methods of designing, but are able to embody in their designs the valuable experience gained in supervising actual construction. As is seen from an illustrated booklet recently prepared by the firm, this construction work is of a very varied character. Some forty pages are occupied by photographs of typical examples of reinforced concrete structures designed and erected by the firm since 1915. A good deal of the work has been done in connection with gas undertakings. There are illustrations of a big workshop at Beckton; of coke-screening plant and bunkers at the Colchester Gas-Works; of bunkers at the Southampton Gas-Works; and of coke-screening plant at Greenwich.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

Aug. 2.

The average values for gas-works products during the week were: Gas-works coal tar, 61s. to 65s. Pitch, East Coast, 80s. to 82s. 6d.; West Coast—Manchester, 77s. 6d. to 80s.; Liverpool, 77s. 6d. to 80s.; Clyde, 77s. 6d. to 80s. Benzole 90 p.ct. North, 2s. 4d. to 2s. 6d.; crude 65 p.ct. at 120° C., 1s. 11d. to 2s. naked at makers' works; 50-90 p.ct., naked, North, 2s. 3d. to 2s. 4d. Toluol, naked, North, 3s. to 3s. 1½d. nominal. Coal tar crude naphtha in bulk, North, 11d. to 11½d. Solvent naphtha, naked, North, 2s. 6d. to 2s. 7d. Heavy naphtha, North, 2s. 7d. to 2s. 9d. Creosote, in bulk, North, liquid, 9½d. to 9¾d.; salty, 8½d. to 8⅝d. Heavy oils, in bulk, North, 10½d. to 11½d. Carbolic acid, 60 p.ct., 1s. 6d. Naphthalene, £20 to £30; salts, £7 to £9, bags included. Anthracene, "A" quality, 8d. to 10d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

A few of the coke-ovens are preparing to start again, so that there should shortly be a small increase in the quantity of tar available for distillers. Apart from this there is nothing fresh in the tar products situation. It seems generally admitted that the scarcity will continue to the end of the year. Pitch is inquired for without business resulting, as sellers are still hesitating. The current value is 75s. to 85s. per ton. Rubber manufacturing companies are still needing supplies of solvent naphtha; and where it is obtained, it comes in the majority from long distances. Nominally, quotations are about 3s. per gallon. There is no chance of any improvement in supplies until production improves considerably. Creosote is a very firm market at 9d. per gallon. Carbolic acid is as flat as ever, with crystals on offer at 6d. per lb. Benzole is not offered; and naphthalenes are dull at late rates.

Sulphate of Ammonia.

The heavy reduction in home prices has induced the placing of orders by agricultural merchants for delivery during this month; the anticipation that prices may be advanced again next month being a powerful incentive. Stocks are substantially lower, and not far from normal; while production is likely to be below normal for some time to come. The trade is generally optimistic. Much, however, depends on foreign competition; but so far this appears to be constituted more largely of anticipation than of realization. Meanwhile, export trade is looking up, and many of our old and best customers are coming back.

Hoylake and West Kirby Gas and Water Company, Ltd.

The report which was presented to the shareholders at the meeting yesterday showed that for the year ended June 30 there was a loss on the gas department of £1801, and a net revenue on water account of £2316. The gas reserve fund, formed under the Order of 1890, being applicable to the payment of dividend in any year in which the clear profits are insufficient to pay the prescribed rates, the Board proposed to transfer from this fund the sum of £1623, making (with the balance brought forward) now available £4700 on the gas account. With the water balance there was a total sum at disposal of £6349. The Directors recommended dividends for the year at the rates, less income-tax, of 7½ and 5¼ p.ct. on the gas capital and 6 and 4½ p.ct. on the water capital, carrying forward the sums of £3889 on gas account and £348 on water account. The effect of the sliding-scale is reflected in the dividends on the gas capital; the standard rates of 10 and 7 p.ct. upon the "A" and "B" classes being automatically reduced to the prescribed rates of 7½ and 5¼ p.ct. respectively, by reason of the price charged for gas during the past year. With reference to a resolution passed on April 20 last, as to the issue of the present authorized but unissued "B" capital as redeemable preference stock, and proposing an increase in the gas undertaking borrowing powers from one-third to one-half of the actually issued and paid-up capital, the Board of Trade have reported upon the case; and the Directors are now awaiting the formal consent. In June last, a further application was made to the Board of Trade for sanction to cancel the sliding-scale restrictions as to the price of gas, and also to still further increase the authorized charges for water for domestic and sanitary purposes. This step was rendered absolutely necessary by the abnormal costs incurred in carrying on both undertakings during the recent coal crisis. As the result, the Board of Trade have issued an Order, by virtue of which the price of gas may be temporarily increased to 10s. per 1000 c.ft., and have authorized an increase of 15 p.ct. on the domestic water charges.

American Gas Coal in Ireland.—It is reported from Limerick that a cargo of over 3000 tons of American gas coal unloaded there has given great satisfaction; the quantity and quality of gas produced being of exceptionally high standard, and the coke equal to that obtained from the best Durham coal. In practical working, according to one authority, the coal has yielded approximately 11,000 c.ft. of gas per ton, leaving 60 p.ct. of coke.

Rathmines Gas Consumers' Complaints.—The Rathmines Urban District Council received a deputation from the Gas Consumers' Protection Association, whose members referred to the proposal of the Alliance and Dublin Consumers' Gas Company to increase the price of gas from 7s. 6d. to 8s. 4d. per 1000 c.ft. as "unwarranted and unjust." The deputation alluded to the unreliability, as they contended, of the slot system, and to hardships arising, as they alleged, from defective meters. The Council thanked the deputation, and agreed to facilitate the work of the Association.

Sulphate of Ammonia and Orange Cultivation.—In a report on the trade of Valencia and Cullena in 1920, H.M. Consul at Barcelona, states (says the "Chemical Trade Journal") that, in consequence of a scarcity of sulphate of ammonia during the past few years, orange lands have been largely fertilized by nitrate of soda; and owing probably to an improper or too lavish use of this article, the condition of the oranges appears to have suffered. As a result, cultivators are again giving preference to sulphate of ammonia, which is now available in good quantities.

Newcastle Gas Company's Dividend.—The Directors of the Newcastle-upon-Tyne and Gateshead Gas Company have declared interim dividends at the rate of 4 p.ct. per annum on the preference stock and 3 p.ct. per annum on the ordinary stock. It is explained that the low rate of dividend on the ordinary stock is due to gas having been sold at a considerable loss in the early months of the year prior to the granting of an Order by the Board of Trade under the Gas Regulation Act empowering an increase in price, and also to the serious effect of the stoppage in the mining industry, which necessitated the purchase of foreign and other coal at high prices, and from which reduced yields of gas and residual products were obtained.

Barrow Carbonizing Plant.—The Gas and Water Committee reported to the Barrow Town Council last week, in connection with the proposed additional vertical retort installation at the Salthouse works, that there had been considered tenders varying from about £25,000 to £33,000; and it was recommended that further consideration of the matter be deferred until next year, as the Works Sub-Committee did not think the present an opportune time for incurring such an expenditure. This was approved by the Council. At the same meeting, it was reported that the Furness Railway Company had decided to extend the period of working the Piel Gas-Works until March 31 next, in order to give consumers the benefit of the works during the coming winter months.

New Water-Gas Plant for St. Mary Church.—A Ministry of Health inquiry has been held at Torquay regarding the Council's application to borrow £5400 for additional water-gas plant at their St. Mary Church Gas-Works. The plant is estimated to cost £2472; buildings, £1000; foundations, £300; connections, £200; and remodelling existing plant, £1400. It was stated that without additional plant it would be impossible to maintain an adequate gas supply in the winter. The demand for gas was rapidly increasing. The present plant, if in working order, would meet anticipated requirements for another year or two; but there was need of extensive alterations and developments. It was also urgently necessary to cut-down production costs and conserve coal. As repair of the present plant would entail its being shut-down for some months, with consequent disorganization of the gas supply, the Council agreed that another complete set of plant of modern design should be laid down as soon as possible, and the present plant remodelled, brought up to date, and used as a duplicate. The existing plant was twelve years old; and a new one would save £400 a year in wages.

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Bo'ness Gas Light Company, Ltd.—At the annual meeting of the Company, it was reported that the income from gas was £9015, and from residuals, &c., £4450. The expenditure, including allowance for depreciation and other charges, amounted to £11,932, leaving a balance of £1532. A dividend of 8 p.ct., free of income-tax, was declared. Coal cost £1509 more than in the previous year; and the wages bill showed an increase of £363.

Metropolitan Gas Company of Melbourne.—Messrs. John Terry and Co., of No. 7, Great Winchester Street, E.C., have received a cablegram from the Metropolitan Gas Company of Melbourne (for whom they act as Agents) informing them that the profits for the six months to June 30 were £63,494. A dividend of 6s. 6d. per share has been declared, and the sum of £23,496 has been carried forward. It was expected that dividends would be paid in Melbourne on the 1st inst.; and those to absentee shareholders will be posted by an early mail.

Spanish Duty on Coal and Coke.—The "Gaceta de Madrid" contains a Royal Order which re-establishes, as from July 20, the Customs duties on coal, coke, and briquettes, which were temporarily suspended in April, 1915. Consignments which are proved, by means of a Consular visa on the manifests or the railway way-bill, to have been dispatched to Spain from a port in a foreign country up to July 20 will be admitted free of duty, as also will consignments awaiting clearance at that date, and those which were stored in warehouse, provided they were declared for consumption within seven days from July 20.

Dundee Gas Accounts.—The published accounts show that the quantity of gas delivered by the Dundee Commissioners during the year ended May 15 was 1,551,168,900 c.ft.; while the capital per million cubic feet stood at £264. The price of gas was 3s. 2d. per 1000 c.ft., subject to a discount of 5 p.ct. There was an income of £370,951; the expenditure of £350,984 leaving £19,967 to meet annuities, interest, and sinking fund. After meeting these charges, there was £24,368 loss. The percentage of unaccounted-for gas was reduced from 8·75 the year before to 6·32. The total gas made per ton of coal carbonized was 15,257 c.ft.

Belfast Gas Undertaking Capital.—It is understood that the Local Government Board for Ireland will sanction the application of the Belfast Corporation for the borrowing of £150,000 to provide working capital for the gas undertaking. At the inquiry held by the Board's Engineering Inspector (Mr. A. D. Price), Mr. John M'Cormick, Town Solicitor, traced the history of the undertaking from its acquisition by the Corporation in 1874 at a purchase price of £386,550. The City Accountant reminded the Inspector that the gas undertaking contributed about £11,000 annually in relief of rates; and Mr. J. D. Smith (the Engineer and Manager) said the charge for gas had increased 100 p.ct. over pre-war cost, being now 3s. 8d. per 1000 c.ft. as against 1s. 9d. in 1913. Coal and oil had increased greatly in price, and wages were up enormously—£153,000 being the total this year, against £52,000 in 1914.

Low-Temperature Carbonization, Ltd.—An extraordinary general meeting was held on Monday of last week to consider a resolution to increase the capital of the Company, by the creation of 150,000 "A" preference shares of 10s. each, from £1,200,000 to £1,275,000, divided into 150,000 "A" preference shares of 10s. each, 600,000 participating preference shares of £1 each, and 600,000 ordinary shares of £1 each. The resolution was carried unanimously; and a similar resolution was also approved at separate meetings of the participating preference and ordinary shareholders.

Thurstonland Gas Project.—It was reported at a meeting of the Thurstonland (Yorkshire) Urban Council last week that the Council's application for power to supply gas within their area had been the subject of a Ministry of Health inquiry in London. The impression brought back by the members who attended was that the Ministry were favourable to the project. A petition signed by several ratepayers, asking the Council not to proceed with the scheme, and contending that it would be a burden on the community, was received by the Council; but it was decided that it should lie on the table.

Price of Gas at Brighouse.—By a large majority, and in the face of labour party opposition, the Brighouse Town Council last week approved an increase in the price of gas by 6d. per 1000 c.ft., so as to meet the extra expenditure incurred by the department owing to the coal strike. The labour objectors suggested that the burden ought to be spread over the next year or two; but the Chairman of the Gas Committee (Alderman J. F. Bottomley) said such a course would be unwise, in view of the slump in the price of residuals. The department was run on proper commercial lines, nothing being expected from it in relief of rates; and it was only fair that the gas undertaking should bear its own losses, without expecting them to be made up out of the rates.

Edinburgh Gas Matters.—At a meeting of the Edinburgh Corporation Gas Committee on the 20th ult., there was submitted a report by Mr. W. R. Herring with regard to the proposed purchase of the foreshore and its reclamation at Granton. The Committee continued consideration of this report until their next ordinary meeting, but meantime remitted to the Convener and Mr. Baxter to interview the Cleansing Committee with regard to the reclamation proposals before that Committee. The Committee continued until next meeting a report by Mr. Herring with regard to the proposal to treat the furnace refuse at the Granton Gas-Works. The Committee examined and approved of the estimates of the ordinary expenditure for gas for the year 1921-22. The estimated total expenditure (including interest and contribution to sinking fund) amounts to £802,530, and the estimated revenue to £803,825. There was read a letter, dated July 20, from the Engineer and Manager (Mr. H. H. Gracie), stating that, as supplies of coal were coming forward in fairly large quantities, he proposed to remove the restrictions as to pressure, and to maintain the normal pressure throughout the day and night. The Committee were authorized accordingly.

Main's Surrey Cooker.

A popular Cooker for Housing Schemes. Invaluable where space is restricted. Mounted on adjustable stand.

R. & A. MAIN, LTD.,
GOTHIC WORKS, EDMONTON, N. 18.
FALKIRK, Etc.

THE "N. C." COKE GRATE.

An open fire grate for use with ordinary gas coke. Complies with the recommendations of the Coal Smoke Abatement Committee.

Price £5

Full particulars on application.

Cost and Price at Thornton.—The Clerk informed the Thornton Urban District Council last week that, from the figures for three months ended June 30, the cost of gas per 1000 c.ft. was about 10s. 6d., while the price charged was 5s. 6d. The increased price of coal and the inferior quality of residuals had made the cost high. There was a loss on the quarter of £1100. If this was not covered under the terms of the Gas Act, it would have to go on the rates for next year. The Sub-Committee had passed a resolution recommending the Council to increase the price of gas to 6s. 6d. per 1000 c.ft. to all consumers, as from July 31. This would recoup the Council for the loss sustained during the strike, but would not wipe-off the whole of the deficit. The recommendation was agreed to.

A motor lorry loaded with coke, belonging to the Merthyr Tydfil Gas Company, got out of control during a change of gear while climbing a steep road at Dowlais, and ran back down the High Street, about 50 yards, knocking down and killing a miner who was returning home from his work.

The Lighting Trades, Ltd., gave a fête to about a thousand of the employees from their southern factories in the grounds of Curtis's & Harvey's "Ironclad" mantle factory at Dartford on Saturday, July 23. Parties from the Volker Lighting Corporation factory at Wandsworth, and Curtis's and Harvey's factory at Earlsfield, numbering more than six hundred, journeyed in motor omnibuses, and on their arrival thoroughly enjoyed "all the fun of the fair." Tea having been served, a concert party from the staff of the Dartford factory gave an admirable entertainment, after which dancing on the green to the music of an excellent band brought to a close a very enjoyable day.

The London County Council, at last week's meeting, considered the recommendation of the Public Control Committee [*ante*, p. 229], that the tender should be accepted of Messrs. Parkinson and Cowan, Limited (Parkinson Branch), City Road, E.C., for the supply of three pairs of gasholders and fittings to the Harrow Road Gas-Meter Testing Office. Seven firms were invited to tender; but only three were able to do so, and they all quoted the same figure of £1050. The Chief Officer's estimate comparable with the tenders was £700. In view of the similarity of the amounts of the tenders and of the increase of 50 p.ct. over the estimated cost, further inquiries were made; but it was not found possible to secure any more advantageous offers. Mr. W. C. Johnson observed that even the most credulous members of the Council could not believe that the similarity of the quotations by the tenderers was a mere coincidence; and he moved a reference back of the recommendation. Mr. C. G. Ammon, who seconded the motion, thought that the discrepancy between the Chief Officer's estimate and the actual tenders received was sufficient justification for criticism. By 31 votes to 10, the Council sent the recommendation back to the Committee for further consideration.

APPLICATIONS FOR PATENTS.

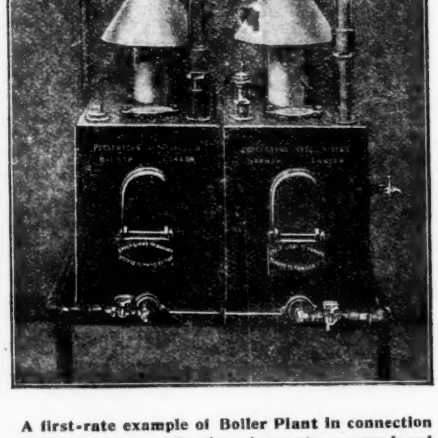
[Extracted from the "Official Journal" for July 27.]

Nos. 19,273 to 19,865.

AIRD, K.—"Atmospheric gas-burners." No. 19,435.
BURLEY, G. A.—"Elbow for pipes." No. 19,719.
CHANCE, K. M.—"Expanding pipe-joints." No. 19,475.
CONWAY, J. K.—"Atmospheric burners." No. 19,424.
CONWAY, J. K.—"Geysers." No. 19,425.
CRAWSHAW, B. P.—"Joints for ferro-concrete, concrete, and earthenware pipes." No. 19,580.
DAVIS, H. N.—"Gas-heated irons for lanndry, &c., use." No. 19,845.
DEWRANCE, Sir J.—"Means for indicating flow of liquids." No. 19,541.
DUCKHAM, Sir A. M.—"Total gasification of fuel." No. 19,537.
FRANCE, G.—"Incandescent burners." No. 19,401.
GALBRAITH, W. L.—"Device for conveying products of combustion from gas-appliances, &c." No. 19,773.
GLUUD, W. W.—"Method of extracting sulphuretted hydrogen from gases." No. 19,669.
GRÜNBAUM, E.—"Heating-burners." No. 19,347.
ILLINGWORTH, S. R.—"Production of smokeless fuel and coke." No. 19,355.
KARR, M. SETON.—See Chance. No. 19,475.
KENT, A. T.—See Duckham. No. 19,537.
LEACH, R. W.—"Plug-cocks." No. 19,655.
LEE, H.—"Pumps, fluid-meters, &c." No. 19,572.
LEE, H.—"Radiator, &c., regulating-valves." No. 19,594.
PARRAM, R. W.—See Conway. Nos. 19,424, 19,425.
PHILLIPS, J. W.—See Galbraith. No. 19,773.
RADIATION, LTD.—"Gas cooking-apparatus." No. 19,656.
RAISTRICK, J. W.—"Combination gas-oven and set-pan." No. 19,392.
ROBERTS, J.—"Carbonization of coal." No. 19,525.
TWIGG, W. R.—See Davis. No. 19,845.
WARDEN, E. H.—"Coking retort ovens." No. 19,402.
WEBSTER, J. P. B.—"Retorts or furnaces." No. 19,498.
WEBSTER, J. P. B.—"Distillation of shale, &c." No. 19,499.
WHITE, A. R.—"Gas and mantle economizer." No. 19,624.
WILSON, W. A.—See Radiation. No. 19,656.
WOODALL, DUCKHAM, AND JONES (1920), LTD.—See Duckham. No. 19,537.
YATES, H. J.—See Radiation. No. 19,656.

South Suburban Gas Company.—The dividend on the South Suburban Gas Company's 5 p.ct. ordinary stock, for the half year ended June 30, is at the rate of £5 6s. 8d. p.ct., as against £3 15s. p.ct. under the Temporary Increase of Charges Order.

VICTOR GAS BOILERS



A first-rate example of Boiler Plant in connection with Hot Water Heating Apparatus, reproduced from actual practice.

The reputation of "VICTOR" Gas Boilers as efficient water heaters stands upon a very firm foundation, and is daily becoming more secure. Their reliability and durability are demonstrated by a long record of successful progress, extending over a period of nearly twenty years.

Substantially constructed throughout of cast-iron, with adequate access for the removal, *in situ*, of lime and flue deposits, "VICTOR" boilers receiving regular attention by way of cleaning can be maintained at a high standard of efficiency.

Hot Water Heating
Hot Water Supply
and Allied Subjects.

THOMAS POTTERTON

Works: BALHAM, LONDON.

Telephone: Streatham 2052-3

Tully Gas Plants, Ltd., have received orders from Redcar, for two 300,000 c.ft. sets; Harpenden (duplication), one 300,000 c.ft. set; and Egremont, one 150,000 c.ft. set.

Mrs. Alice Flavell, wife of a London police inspector, of Highbury, was making a cup of coffee over a gas-stove when her clothing caught fire. She sustained severe injuries, and died later in the Great Northern Hospital.

The Brechin Gas Company, Ltd., are declaring a dividend of 2s. per share, less tax. The price of gas is not increased from 5s. 10d. per 1000 c.ft. It is stated that the system of vertical retorts introduced last year has given great satisfaction.

Negotiations in connection with the acquisition of the Dunning Gas-Works by a newly-formed Company are well forward; and it is expected that in a short time gas will be supplied to consumers. The works have been closed down for the past three months.

THE THERM PRICE CALCULATOR

(Protected.)

A **SLIDE RULE** designed by Mr. H. R. ASKEW, Assoc.M.Inst.C.E., B.Sc. (Eng.), &c., for quickly and accurately converting "Price per Thousand" into "Price per Therm," and *vice versa*.

AN INVALUABLE ADJUNCT TO EVERY GAS OFFICE.

For Description, see "JOURNAL," Jan. 12, p. 88.

Price 10/6, post free.

Walter King, "JOURNAL" Offices, 11, Bolt Court, Fleet Street LONDON, E.C. 4.

STOCK MARKET REPORT.

THERE was little, if any, particular change last week in the state of things on the Stock Exchange. Any increase in the volume of business was, of course, out of the question at this season; and the tendency of the various markets remained at about the same level—viz., fairly steady for the most part, but with one or two marked exceptions. At the close, the tone was cheerful.

The gilt-edged department did well on the whole. Home Government issues were firm. Friday's figures for the big four were: Consols 48½-49¼, War Loan 88⅛-88 6/16, Funding 71⅛-71⅝, Victory 76⅛-76⅞. Bonds were not quite so good; but Colonials, Indian, and Corporations were good. Home Rails were dull; but Canadians and Argentine advanced.

The Foreign Market was variable. Brazilian, Chinese, and Japanese were well supported, but French, German, and Russian not so. The Miscellaneous market was dull. Rubber and Oil had their troubles, and Industrials presented no attraction to investors.

Business in the Gas market had quite a spurt of activity in spite of the holiday season. The tendency was very firm, actuated no doubt by the higher rates of dividend which are being declared. In the London companies, Gas Light maximum rose 1, and the ordinary was done at 58. South Metropolitan ordinary and preference had a rise, and Commercial was steady. In the Suburban and Provincial group, Alliance and Dublin advanced 2; and further rises were marked in Ilford, South Suburban, and Sheffield. Imperial Continental was very quiet, and fell back a point. Primitivas were almost neglected.

Bargains done for cash during the week were as follows: On Monday, Brentford preference 69½, 69¾, Cape Town preference £5 9s. 6d., Gas Light ordinary 56½, 56⅝, 56⅞, 57, ditto preference 58½, 59¼, ditto debenture 51⅞, 51⅝, Imperial Continental 131, North Middlesex 7 p.ct. 7 15/16, 8 1/16, Primitiva debenture 66, 66½, South African 6½, South Metropolitan 68, Ryde 5 p.ct. 50. On Tuesday, Brentford "A" 66, 67½, ditto debenture 62½, Commercial 4 p.ct. 55, Gas Light ordinary 56½, 56⅞, ditto maximum 43½, ditto debenture 51½, Imperial Continental 130, 130⅜, 131, 131½, 131⅜, Wandsworth debenture 48, Bournemouth 3 p.ct. debentures 45½, 45⅜. On Wednesday, Bournemouth debentures 57, 58, Brentford "A" 66¾, Cape Town debenture 58, European 7⅞, 7½, Gas Light ordinary 56½, 57, 57⅛, ditto preference 59, ditto debenture 52, Oriental 89½, 90, South Suburban 66, Tottenham "B" 54½, 54⅜. On Thursday, Alliance and Dublin 45, Brentford "A" 66½, 67½, Gas Light ordinary 57, 57¼, ditto preference 60, ditto 10 p.ct. bonds 134, 135, Imperial Continental 130, 130½, Oriental 92, Primitiva 92., South Metropolitan 67½, 68, ditto debenture 46⅜, 48½, Wandsworth "B" 55½, Cardiff 7½ p.ct. debenture 101, Croydon 5 p.ct. debenture 74½, Kingston-on-Thames 45½. On Friday, Brentford "B" 63, Continental Union 19⅜, Croydon "B" and "C" 103, 103½, European 7⅞, 7 15/16, Gas Light ordinary 56⅜, 57, 57⅛, 57½, 58, ditto debenture 51½, 52, Ilford "B" 56⅛, 57½, Imperial Continental 130, 131, Lea Bridge 70, 71, South Metropolitan 65½, 66, 67, 68, ditto debenture 48½, South Suburban 65½, Croydon 5 p.ct. "D" 65½.

In the Money Market, after an easy opening, the position became firmer, and so continued until near the close, when it again relaxed. Discount terms were firm. The Bank rate is 5½ p.ct., as fixed on July 21.

The Welshpool Gas Company announce that, owing to the heavy loss that has been occasioned by the coal strike, they are compelled to raise the price from 8s. 4d. to 10s. per 1000 c.ft.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	...	53—58	...
1,351,868	,,	Apl. 14	2½	3 1/16%	Alliance & Dublin Ord.	59—64	41—46	45
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	46—51	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5¼—6¼	3¼—4	...
100,000	5	Feb. 25	16	5%	Bournemouth Gas and Water { 5 p.c.	...	7⅛—8⅛	...
383,110	10	,,	7	7%	B 7 p.c.	15—15⅛	8⅛—9⅛	...
115,000	10	,,	6	6/-	Pref. 6 p.c.	13⅛—14	7⅛—8⅛	...
162,065	—	June 30	—	4%	4 p.c. Deb.	...	54—59	57—58
992,045	Stk.	July 15	14	56/-	Brentford A Consolid.	261—266	63—68	66—67½
734,920	,,	,,	11	55/-	Do. B New	204—209	60—65	63
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	67—71	69½—69⅝
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	56—58	62½
214,775	,,	Mar. 11	11	7½%	Brighton & Hove Orig.	208—213	102—107	...
244,200	,,	,,	8	5⅜%	Do. A Ord. Stk.	154—159	75—80	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Mar. 30	12½	10%	British	44—45	22—24	...
120,000	Stk.	June 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	53—56	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	36—39	...
100,000	10	May 27	—	6%	Cape Town & Dis., Ltd.	1½—2½	6½—7½	...
100,000	10	Apl. 28	—	4½%	Do. 4½ p.c. Pref.	4—6	4½—5½	£5/9/6
100,000	Stk.	June 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	53—58	58
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,380	,,	July 28	5/9/4	42/8	Commercial 4 p.c. Stk.	106—108	53—58*	55
560,000	,,	,,	5⅛	38/4	Do. 3½ p.c. do	103—105	50—55*	...
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	42—45	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	17—22	19½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	30—40	30
51,600	,,	Feb. 5	15	10%	Croydon A 10 p.c.	...	125—135	...
278,400	—	,,	12	7%	Croydon B and C 7 p.c	..	95—105	103—103½
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17⅛—18	7—8	7⅛—7⅜
16,298,975	Stk.	Feb. 10	4/17/4	30/-	Gas Light and Coke { 4 p.c. Ord.	98—102	56—58	56⅜—58
2,600,000	,,	,,	3⅛	26/3	3½ p.c. max.	76—79	43—46	43⅛
4,062,235	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	57—60	58⅛—60
4,674,850	,,	June 15	3	3%	3 p.c. Con. Deb.	72⅛—74⅛	49—52	51⅛—52
130,000	,,	Dec. 11	10	10%	10 p.c. Bonds.	...	...	134—135
82,500	,,	Mar. 11	5	3⅛%	Hastings & St. L. 5 p.c.	...	48—53	...
258,740	,,	,,	3⅛	2⅛%	Do. 5½ p.c	87—89	34—39	...
70,000	10	May 12	11	5%	Hongkong & China, Ltd.	16⅛—16⅛	5—6	...
86,600	Stk.	Mar. 11	9	5⅛%	Hornsey 7 p.c.	...	75—85	...
131,000	,,	July 28	7½	7½%	Ilford A and C	151—154	76—81*	...
65,780	,,	,,	6½	5⅛%	Do. B	115—118	55—60*	56⅛—57⅛
63,500	,,	June 30	4	4%	Do. 4 p.c. Deb.	92—94	53—55	...
1,976,000	,,	May 27	9	5%	Imperial Continental	150—160	130—135	130—131½
1,235,000	,,	Feb. 10	3⅛	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	77—82	...
235,242	,,	Mar. 30	6½	3⅛%	Lea Bridge Ord. 5 p.c.	119—121	68—73	70—71½
1,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A	111—113	...	...
					{ B	146—149	...	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk	...	...	...
165,736	,,	Feb. 25	7/5/6	3⅛%	Maidstone 5 p.c.	...	52—57	...
63,480	,,	Dec. 30	—	3%	Do. 3 p.c. Deb.	...	40—43	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4½—4¾	1⅛—2⅛	...
250,000	100	Apl. 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—93	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd.	11⅛—12	60—70	...
1,875,892	,,	July 29	4½	3%	Newcastle & Gatsh'dCon.	98⅛—99⅛	58—59*	...
529,705	,,	June 30	3⅛	3⅛%	Do. 3½ p.c. Deb.	82—83	48⅛—50⅛	...
15,000	10	Mar. 11	—	8%	North Middlesex 10 p.c.	...	12⅛—13⅛	...
55,940	10	,,	7/14/0	58%	,, ,, 7 p.c.	14—15	7⅛—8⅛	7 15/16—8 1/16
300,000	Stk.	May 12	8	8%	Oriental, Ltd.	117—122	88—93	89½—92
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅞	2—3	...
188,120	Stk.	June 30	—	3⅛%	Plym'th & Stoneh'se 5 p.c.	...	53—58	...
60,000	50	Feb. 25	13	7⅛%	Portsea Island, B	128—131	65—70	...
100,000	50	,,	12	6⅛%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	⅛—⅜	9/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4⅛—5	1⅛—1⅜	...
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—95	65—67	66—66½
600,000	Stk.	July 28	4	4%	Do. ,, ,, 1911	...	36—39*	..
546,198	,,	June 30	4	4%	River Plate 4 p.c. Deb.	85—87	36—39	..
150,000	10	Mar. 30	6	6/-	San Paulo { 6 p.c. Pref	10⅛—11	5⅛—6⅛	...
125,000	50	June 30	5	5%	5 p.c. Deb.	47—49	34—39	...
135,000	Stk.	Mar. 30	10	5%	Sheffield A	223—224	63—64	...
209,984	,,	,,	10	4½%	Do. B	222—224	62—64	...
523,500	,,	,,	10	3⅛%	Do. C	220—222	61—63	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	June 30	9	8%	South African	10⅛—11⅛	7—9	6⅛
6,609,895	Stk.	July 28	5/4/0	5%	South Met. Ord.	111—113	65—67*	65⅛—68
250,000	,,	July 14	—	5%	Do. Red. Pref.	...	92—94	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72⅛—74⅛	46—49	46⅛—48⅛
224,820	,,	Feb. 25	8⅛	7⅛%	South Shields Con. Stk.	157—159	85—87	...
1,087,795	,,	,,	6	3⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	62—67	65⅛—66
368,837	,,	June 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	72—77	...
647,740	,,	May 12	7⅛	3⅛%	Southampton Ord.	99—102	55—58	...
121,275	,,	June 30	4	4%	Do. 4 p.c. Deb. Stk.	...	56—58	...
120,000	,,	Feb. 25	—	3⅛%	Tottenham { A 5 p.c.	135—138	59—63	...
782,275	,,	,,	6	2⅛%	District { B 3½ p.c.	115—117	50—55	54⅛—54⅜
181,255	,,	June 15	4	4%	{ 4 p.c. Deb.	87—89	52—55	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Feb. 25	5	3⅛%	Tynemouth 5 p.c. max.	108⅛—109	68—70	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 25	8⅛	47/6	Wandsworth A 5 p.c.	151—156	78—83	..
255,636	,,	,,	6⅞	32/6	Do. B 3½ p.c.	129—134	55—60	55⅛
108,075	,,	,,	—	33/3	Do. C	...	55—60	...
140,865	,,	,,	—	33/3	New Ordinary	...	55—60	...
152,000	,,	,,	6⅛	26/3	Wimbledon 5 p.c.	117—122	57—62	...
98,000	,,	,,	6⅛	32/6	Epsom 5 p.c.	121—126	55—60	...
88,416	,,	June 30	3	3%	5 p.c. Deb. Stk.	66—69	40—45	43—48

* Ex Div.

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